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**An empirical investigation of the incremental information content of
earnings, working capital from operations, and cash flow from operations
affected by their extremity: new evidence for the UK**

By

Wael Mostafa

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**A thesis
submitted in fulfillment of
the requirements for the Degree of
doctor of Philosophy**

At

**The School of Economics, Finance, and Business
University of Durham**

December 2005



15 MAR 2006

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



وَقُلْ أَعْمَلُوا فِى سَبِيلِ اللَّهِ عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ

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Abstract

This study has examined the incremental information content of earnings, working capital from operations, and cash flow from operations. Based on an association study over an annual holding period for a sample size of 1634 British firms over 7 year periods from 1996 to 2002 which produce a sample of 6851 firm year observations.

The analysis is conducted in two separate stages. First, following recent U.S. work (e.g., Ali, 1994; Cheng et al., 1996; Cheng & Yang, 2003) the study examined the incremental information content of cash flow from operations and earnings and the effect of extreme earnings on the incremental information content of cash flow from operations. Second, the study assessed the generality of the findings of recent U.S. studies by employing testable hypotheses to investigate the incremental information content of cash flow from operations and working capital from operations in separate empirical models.

The first stage of this study makes the following contributions to the incremental information content of cash flow and earnings literature in U.K. First, this study employs actual cash flow data. Second, none of the prior U.K. studies shares the research focus which is to examine the effect of earnings extremity on the incremental information content of cash flow and earnings whilst controlling for the extremity of cash flow itself. Third, this study employs a large sample size for a more recent period.

The first stage examined whether cash flow from operations and total accruals, as a whole, are associated with returns differently (which do not necessarily hold with respect to assessing the differential valuations of cash flow from operations and current accruals). The research literature indicates (i) a higher valuation of both current accruals and cash flow from operations than non-current accruals (this issue has been widely documented see for example Rayburn, 1986; Wilson, 1986 & 1987; Pfeiffer et al., 1998; Pfeiffer & Elgers, 1999) and (ii) weak evidence on the differential higher valuations of cash flow over current accruals (e.g., Bernard & Stober, 1989; Jennings, 1990; Ali 1994; Ali & Pope 1995, Pfeiffer et al., 1998; Green 1999). The second stage therefore assessed the generality of recent U.S. findings that examined the incremental information content of cash flow from operations and earnings and extended this work by examining the incremental information content of cash flow from operations beyond working capital from operations to identify (i) whether cash flow from operations and current accruals are valued differently, and (ii) whether extreme working capital from operations lead to incremental information content for cash flow from operations.

The results of the first stage showed first, cash flow from operations has incremental information content beyond earnings. Second, extreme earnings lead to incremental information content only for moderate (not extreme) cash flow from operations. In other words, cash flow from operations and total accruals are valued (associated with returns) differently from each other and moderate cash flow from operations has higher valuation than extreme total accruals. These results are consistent with the findings of recent U.S. studies.

The results of the second stage showed first, cash flow from operations did not have incremental information content beyond working capital from operations. Second, extreme working capital from operations lead to incremental information content for only moderate (not extreme) cash flow from operations. In other words, cash flow from operations is not more highly valued than current accruals. However, moderate cash flow from operations has higher valuation than extreme current accruals.

In part, the results of the second stage contradict the findings of recent U.S. studies, and indicate that there is no evidence of similar results of the incremental information content of cash flow from operations as in the first stage. However, these results are consistent with recent U.S. studies in respect of the role of moderate cash flow from operations in explaining the value when either earnings or working capital from operations are extreme.

Based on the findings of the two stages together and given the higher valuation of both cash flow and current accruals than non-current accruals, this study comes to the following two main conclusions. First, without considering the impact of the extremity of working capital from operations on the incremental information content of cash flow, the decomposition of earnings into only its non-current accruals, and working capital from operations components are consistent with the information set used to value equity securities and separate disclosure of cash flow is not value relevant. Second, when considering the impact of the extremity of working capital from operations on the incremental information content of cash flow the results of this study indicate that cash flow becomes more important for valuation as accruals get “noisy”. Overall, since working capital from operations is unlikely to persist to be permanent across the years, these results can be interpreted as indicating that cash flow and accruals are used jointly by investors with one being more important than the other depending on the relative “extremeness” of each. Therefore, both are of value to the investor and both should be reported.

Declaration

No portion of the work referred to in this thesis has been submitted in support of an application for another degree of qualification of this or any other university or other institute.

Wael Mostafa

December 2005

Statement of copyright

The copyright of this thesis rests with the author. No quotation from it should be published without their prior written consent and information derived from it should be acknowledged.

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Finally, I deeply thank my parents, my brothers and my sisters for their unending love and support.

Any errors contained remain my own responsibility.

Dedication

To my parents, my brothers, and my sisters

Chapter 1: Research introduction

1.1 Introduction

1.2 Research problem and motivations for this research

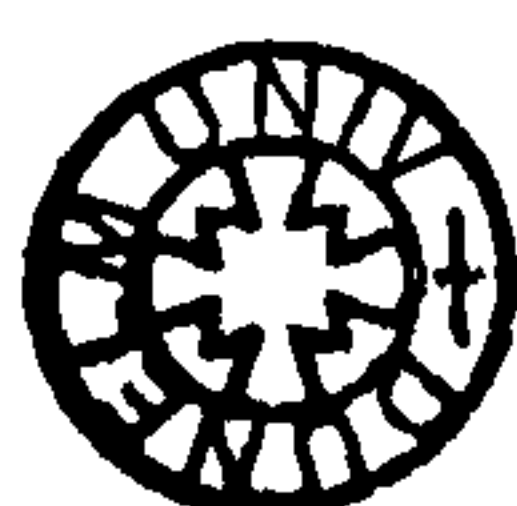
1.3 Research objectives

1.4 Research hypotheses

1.5 Research importance

1.6 Contributions of the study

1.7 Structure of the study



Chapter 1: Research introduction

1.1 Introduction

Incremental information content of cash flow and earnings studies are considered an area within market-based accounting research (MBAR). MBAR is built upon the efficient market hypothesis (EMH) which proposes that capital markets are both efficient and unbiased (Williams, 1995). MBAR examines the relation between capital markets and accounting information contained in financial statements. Specifically, this approach seeks to find out whether this accounting information has information content. According to this approach, stock returns are viewed as encompassing both cash flow and earnings information when evaluating a firm's performance in generating future cash flow of current and potential investments.

Cash flow from operations has been supported for its role of assessing a firm's liquidity¹, if a firm is to continue operating effectively over a number of years, the operating activities must generate sufficient cash flow from operations so that inventory can be replaced, creditor's claims can be paid, and plant and equipment can be replaced as they wear out. Cash flow provided (or used) by operations is therefore an important indicator of the firm's financial health, particularly when such cash flow from operations is assessed over several years.

Since 1986 the incremental information content of cash flow and earnings studies have occupied an important place in accounting research perhaps because of the original arguments related to the importance of cash flow accounting versus accrual accounting. The research evaluates the usefulness of disclosing cash flow data. More specifically, studies on incremental information content of cash flow and earnings have been conducted to investigate the potential of cash flow to complement earnings in explaining security returns.

The literature has explored extensively the incremental information content of cash flow and earnings (e.g., in the U.S., Patell & Kaplan, 1977; Beaver et al., 1982; Schaefer & Kennelley, 1986; Rayburn, 1986; Bowen et al., 1987; Wilson,

¹ To be explored in chapter 2, section 2.3.2.1.

1986 & 1987; Bernard & Stober, 1989; Livant & Zarowin, 1990; Ali, 1994; Cheng et al., 1996; Cheng et al., 1997; Pfeiffer et al., 1998; Pfeiffer & Elgers, 1999; Cheng & Yang, 2003; in the U.K., Board & Day, 1989; Board et al., 1989; Ali & Pope, 1994; Ali & Pope, 1995; Clubb, 1995; Charitou, 1997; Garrod & Hadi, 1998; Green, 1999; Charitou et al., 2001; Other studies Bartov et al., 2001; Haw et al., 2001)². Overall, the empirical work in this area represents a concerted effort to examine the role of cash flow information in firm valuation (Neill et al., 1991).

The earliest studies, which were published in the 1980s, on the incremental information content of cash flow from operations and earnings provided only limited support or mixed and inconclusive results regarding the incremental information content of cash flow and for its role in security evaluation (e.g., in the U.S., Schaefer & Kenneley, 1986; Wilson, 1986 & 1987; Rayburn, 1986; Bowen et al., 1987; Bernard & Stober, 1989; Ali, 1994; in the U.K., Board & Day, 1989; Board et al., 1989; Ali & Pope, 1995).

More recently however, researchers have begun to explore the effect of earnings extremity on the incremental information content of cash flow from operations and earnings and develop a more accurate proxy for the unexpected amount of cash flow and earnings. In these recent studies, researchers employed the level and change of cash flow and earnings as an estimation of their unexpected components and they isolated extreme cash flow from operations and earnings³ apart from moderate ones based upon those extreme earnings and cash flow have limited information content. This recent work on the incremental information content of cash flow and earnings provides significant results regarding the incremental information of cash flow beyond that contained in earnings, especially, in the case of studies that have examined the effect of earnings extremity on the incremental information content of cash flow from operations and earnings (e.g., in the U.S., Ali, 1994; Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang, 2003; in the U.K., Garrod & Hadi 1998; Green 1999; Charitou et al., 2001).

² For an extensive review of these studies, see chapter 4.

³ In this study and following Cheng & Yang (2003) the terms moderate and permanent and the terms extreme and transitory are used interchangeably. For more details of these terms and their implications for market based accounting research (MBAR) studies, see chapter 3, section 3.4.2.

1.2 Research problem and motivations for this research

In the U.S., reporting of cash flow was not required before FASB 95 came into effect in 1987 and most studies on incremental information content of cash flow from operations and earnings employed an estimated figure for cash flow. These estimates of cash flow were poor proxies for actual cash flow (see for example, Bahnson et al., 1996; Cheng et al., 1997). Cheng et al. (1997) examined the incremental information content of reported cash flow from operations beyond readily available estimates of cash flow from operations. They showed that reported cash flow from operations possess incremental information content, i.e. perform an incremental role in explaining security prices, after controlling for both earnings and estimated cash flow from operations. In contrast, their findings did not support the view that estimated cash flow from operations has incremental information content after controlling for both earnings and reported cash flow from operations.

Recently, at least three studies in the U.S. on incremental information content of cash flow and earnings, Cheng et al. (1996), Cheng et al. (1997), and Cheng & Yang (2003), employed actual cash flow figures. These studies documented the incremental information content for cash flow from operations by using the change in cash flow and earnings or the level and the change in cash flow and earnings as a proxy for their unexpected amounts. In these studies, cash flow from operations showed a complementary role for earnings even without addressing the issue of extreme earnings⁴.

In the U.S., Ali (1994) tested the incremental information content of cash flow from operations in the presence of its extremity and his study showed that extreme cash flow is less informative than moderate cash flow. In other words, he found that the market puts more weight on moderate cash flow than on extreme cash flow. He did not control for the effect of earnings extremity⁵. Also,

⁴ Recent work on incremental information content of cash flow and earnings (e.g., Cheng & Yang 2003) showed that it is easier for cash flow from operations to have incremental information content beyond extreme earnings. The reason is that the market will value the secondary measure, cash flow from operations, rather than the primary measure, earnings, if this primary measure is extreme than the secondary measure.

⁵ In other words, Ali (1994) did not examine the effects of extreme earnings on the incremental information content of cash flow from operations.

in the U.S. Cheng et al. (1996) examined the effect of earnings extremity on the incremental information content of cash flow from operations and earnings and their study showed that the market places a higher weight on cash flow when earnings are extreme than when earnings are moderate. They did not control for the extremity of cash flow itself⁶.

Cheng & Yang (2003) employed U.S. data based on a sample size of 25993 U.S. firm year observations over the period from 1989 to 1997 to investigate the effect of the extremity of earnings on the incremental information content of cash flow from operations⁷ and unlike Ali (1994) and Cheng et al. (1996), they also controlled for the extremity of cash flow from operations itself. They saw that the incremental information content of cash flow depends not only on the permanence of earnings but on both: (i) the permanence of earnings, and (ii) the permanence of cash flow. They found that the effect of extreme earnings lead to incremental information content only for moderate cash flow and not for extreme cash flow.

To date in the U.K., almost no studies have documented incremental information content for cash flow from operations beyond earnings (see for example, Board & Day, 1989; Board et al., 1989; Ali & Pope, 1994 & 1995; Green, 1999; Charitou et al., 2001) similar to the recent U.S. studies, mentioned above (see, Ali, 1994; Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang, 2003). The following points can be noted regarding all previous U.K. studies on the incremental information content of cash flow and earnings in comparison with U.S. research in this area.

1. All of them have employed an estimate for cash flow since reporting cash flow was not required before 1991 (FRS1). As indicated above these estimates of cash flow were poor proxies for actual cash flow (see for example, Bahnson et al., 1996; Cheng et al., 1987) and thus the issue of whether cash flow from operations has incremental information content beyond earnings is unresolved yet in U.K. and the direct evaluation of

⁶ In other words, Cheng et al. (1996) did not isolate extreme cash flow apart from moderate ones when they examine the effects of extreme earnings on the incremental information content of cash flow and earnings.

⁷ Cheng & Yang (2003) called the effect of earnings extremity on the incremental information content of cash flow the supplementary role of cash flow. See chapter 4, Section 4.3.2.2.

FRS No.1 disclosures is still required. Bahnson et al. (1996) recommended repeating the previous research on the usefulness of cash flow due to the measurement errors in the estimated figures of cash flow from operations employed in prior research. They stated that:

"While it is possible that future research based on reported operating cash flow will not reverse the finding of these earlier studies, the fact remains that the literature is deficient until that research is replicated with reported measures instead of estimates. The authors of those studies (or other researchers) may wish to repeat them using reported operating cash flow instead of the clearly questionable estimates that were originally used. Until these new studies are performed, the usefulness of the original findings is suspect" (P. 8).

2. No studies in the U.K. have addressed the effect of earnings extremity on the incremental information content of cash flow and earnings whilst controlling for the extremity of cash flow itself equivalent to Cheng & Yang (2003) in U.S. Only Charitou et al., (2001) in the U.K. examined the effect of earnings extremity on the incremental information content of cash flow but like Cheng et al. (1996) they did not control for the extremity of cash flow itself. And in contrast to Cheng et al. (1996), Charitou et al., (2001) were not able to find incremental information content for cash flow from operations when earnings are extreme.
3. The sample size of these U.K. studies on the incremental information content of each flow and earnings was relatively small. The sample size ranged from 39 British manufacturing firms over the period from 1962 to 1977 in the study of Board & Day (1989) to 4531 firm year observations for a sample of 197 British firms over a 23-year period covering the period from 1971 to 1993 in the study of Green (1999). Hence, these relatively small sample sizes limit the generalisability of their conclusions.

These comments give rise to the first objective of this study as an examination of incremental information content of cash flow from operations and earnings.

The principal differences between this study and those of previous U.K. studies are as follows.

1. This study uses post-FRS No. 1 information derived from statements of cash flow. Using reported cash flow information eliminates the need to develop a proxy for cash flow, and avoids the articulation problem⁸.
2. This study follows recent work in the U.S. (see for example, Ali, 1994; Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang, 2003) in examining the effect of extreme earnings on the incremental information content of cash flow from operations and earnings. This study also differs from Charitou et al., (2001) which was conducted using U.K. data in that it controls for the extremity of cash flow itself when examining the effect of earnings extremity on the incremental information content of cash flow and earnings.
3. A third difference between this study and previous U.K. research in this area is that this study has employed a large sample size with a more recent period. The sample size is 6851 firm year observations for a sample of 1634 British firms over 7 year periods from 1996 to 2002⁹. This large sample and the relatively recent period allow the possibility of generalising the results of this study.

Regarding 2 above, the effects of extreme earnings on the incremental information content of cash flow from operations, Cheng et al. (1996) stated that: "When the valuation implications of earnings are limited by the presence of transitory items, cash flow from operations disclosures may play a larger role as an additional value signal" (P.173).

Cheng et al. (1996) and Cheng & Yang (2003) have found incremental information content for cash flow from operations when earnings are extreme. This is because, when earnings have less information content, the market will look for another measure which has more information content and a good surrogate measure for earnings, when earnings are extreme, is cash flow from operation (Cheng & Yang, 2003). In this study, when we examine the incremental information content of cash flow and earnings, earnings are

⁸ See Bahnson et al. (1996) for more details about this problem.

⁹ See data collection and sample selection in chapter 5, section 5.3.

considered the primary profitability measure and cash flow from operations is the secondary profitability measure. As stated before, when earnings have less information content, the market will look for another measure which has more information content and a good surrogate measure for earnings is cash flow from operations. When cash flow from operations is extreme and has less information content, the market will depend upon the primary profitability measure which is earnings irrespective of whether earnings themselves are extreme or moderate. On this basis, this study investigates the effect of earnings extremity on the incremental information content of cash flow from operations and earnings and not the opposite case which is the effect of extreme cash flow on the incremental information content of cash flow and earnings¹⁰. As stated in 2 before, when the effects of earnings extremity on the incremental information content of cash flow and earnings are examined, this study follows the same methodology of Cheng & Yang (2003) by controlling for the extreme cash flow as well¹¹.

We now turn to the second issue in this study; here the study seeks to assess the generality of the findings of recent U.S. studies (e.g., Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang; 2003; among others) which reported evidence that cash flow from operations has incremental information content beyond earnings. This evidence is not consistent with a large number of previous studies evaluating the disclosures of earnings components (e.g., in the U.S., Schaefer & Kenneley, 1986; Bernard & Stober, 1989; Ali, 1994; Pfeiffer et al., 1998; in the U.K., Board & Day, 1989; Board et al., 1989; Ali & Pope, 1994 & 1995; Green, 1999; Charitou et al., 2001). The following quotation of Lev & Ohlson (1982) gives only little support to the information content of accounting measures other than earnings:

"Accounting data convey useful and timely information to investors. While this conclusion definitely holds for (historical cost) earnings data, the marginal contribution of the voluminous non-earnings data published in financial reports is still largely unknown" (P. 250).

¹⁰ Cheng & Yang (2003) investigated the two opposite cases.

¹¹ This means that this study isolates extreme cash flow from operations apart from moderate ones when examining the effects of extreme earnings on the incremental information content of cash flow and earnings.

In the part of the literature upon which we rely as an approach for this study, market based accounting research (MBAR), it was well documented that there was a contemporaneous relation between returns and earnings. The literature then went to the next logical step and decomposed earnings into its components. The reporting of earnings components, i.e., operating cash flow, current accruals, and non-current accruals, rests on the premise that such disaggregated disclosures are informative to investors (Pfeiffer & Elgers, 1999). Jennings (1990) stated that:

"if the criterion for evaluating the disclosures of income components is association with returns, knowledge of the components of income is preferred by investors only when the components are valued (associated with return) differently from each other. For components that are valued by the market equivalently, disclosure of their sum is sufficient because investors are indifferent to which components contributed more or less to income"(P.926).

The standard model employed to examine the incremental information content of (i) earnings, (ii) working capital from operations, and (iii) cash flow from operations is to estimate the following model¹² (see for example Ali, 1994; Ali & Pope 1995, Pfeiffer et al., 1998):

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta WC_{it} + \alpha_{3t} \Delta CF_{it} + \varepsilon_{it}$$

Where: R_{it} is the annual market abnormal returns, ΔE_{it} is the change in earnings, ΔWC_{it} is the change in working capital from operations, and ΔCF_{it} is the change in cash flow from operations; for firm i in year t . ε_{it} is the error term. Change in earnings, working capital from operations and cash flow from operations were deflated by the market value of equity at the beginning of year t . The results of this model are interpreted as follows:

"A positive coefficient on cash flows from operations implies that the market responds more favorably to cash flow than to current accruals,

¹²The interpretation of the results of the above model in terms of the composition or disclosure of income depends on the other independent (conditioning) variables included in the estimated relation (Jennings, 1990). So alternatively, earnings, working capital from operations, and cash flow from operations variables can be examined by regressing abnormal returns on (i) unexpected cash flow from operations, (ii) unexpected current accruals, and (iii) unexpected non-current accruals and test whether: (a) any of the coefficients are nonzero provide evidence that whether the variables have incremental information content beyond each other, and (b) various coefficients are the same provide evidence for evaluating the separate disclosures of earnings components (the securities market's differential pricing of earnings components).

possibly because accruals are subject to manipulation and high liquidity signals financial prosperity. A positive coefficient on working from operations implies that the market responds more favorably to current accruals than to non-current accruals, possibly because non-current accruals (e.g., depreciation) are only indirectly linked to future cash flows. A positive coefficient on earnings implies that non-current accruals have incremental information content beyond that contained in cash flows and current accruals" (Ali, 1994, P. 63.).

Numerous studies (e.g., Bernard & Stober, 1989; Jennings, 1990; Ali, 1994; Ali & Pope, 1995; Pfeiffer et al., 1998¹³; Green, 1999) showed that the coefficient on cash flow from operations in the previous model is insignificant which reveals that both cash flow from operations and current accruals are equivalently informative and hence disclosure of their sum which is working capital from operations is sufficient.

As indicated before, the supplementary role of cash flow from operations as a unique component of earnings in determining stock prices was not clear and almost there are no empirical papers that have been able to support this role. Only recently in the U.S., Cheng et al. (1996), Cheng et al. (1997), and Cheng & Yang (2003) among others, supported the incremental information content of cash flow from operations beyond earnings. In these recent studies and in contrast to the standard model of assessing the incremental information content of earnings, working capital from operations, and cash flow from operations, they estimated the following model¹⁴

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \epsilon_{it}$$

Where: R_{it} is the annual market abnormal returns, ΔE_{it} is the change in earnings, and ΔCF_{it} is the change in cash flow from operations; for firm i in year t . ϵ_{it} is

¹³ Pfeiffer et al. (1998) reported a statistically significant differential valuation of cash flow and current accruals when they employed a pooled cross-sectional and time series data for estimating surprises in earnings, working capital from operations, and cash flow from operations.

¹⁴ To examine the incremental information content of cash flow from operations and earnings, we estimate four models: (a) Change model (Model 1), (b) Level and change combined model (Model 2), and (c) Contextual models with a dummy variable approach for measuring the effect of the extremity of earnings on the incremental information content of cash flow from operations whilst controlling for the extremity of cash flow from operations (Model 3 & Model 4). See chapter 5, section 5.4.3 for a full discussion of these four models.

the error term. Change in earnings, and in cash flow from operations were deflated by the market value of equity at the beginning of year t .

These recent studies documented the incremental information content for cash flow from operations by even using a simple linear model of the relation between annual abnormal returns and unexpected changes in annual earnings and cash flow from operations. The accounting interpretation of these results, in terms of disclosure of earnings components, means that cash flow from operations and total accruals are valued (associated with returns) differently from each other which indicates that

"Investors will respond differently to unexpected earnings depending on whether it is due to unexpected cash flows or unexpected accruals and, therefore, would prefer that these components be disclosed separately" (Jennings, 1990, P. 928).

With respect to the differential valuations of cash flow from operations and current accruals, it is not necessary that these results should hold. In other words, it is not clear if investors will respond differently to unexpected cash flow and unexpected current accruals. The main criticism regarding these recent studies which employed the previous model is that their attention was focused on examining the incremental information content of cash flow from operations only beyond earnings. In other words, the focus of these studies was to assess whether cash flow from operations is valued differently from total accrual as a whole, which consists of both current and non-current accruals. The following quotation of Mcleay et al (1997) shows that disaggregating earnings into cash flow from operations and total accruals components would be preferable. However, disaggregating working capital from operations into cash flow from operations and current accruals components would not be preferable¹⁵:

"Cash flow does appear to have relevance for financial market. However, whilst the results suggest the existence of incremental information content in earnings with respect to cash flow, there is inconclusive evidence of differential information content between funds flow and cash flow themselves" (P.1179).

In the previous model, placing only earnings and cash flow from operations in the same equation says little about the relative importance of cash flow from

¹⁵Bernard & Stober (1989) offered three bases for expecting differential security price implications for cash flow and accruals: (i) quality of earnings, (ii) the macroeconomic conditions, and (iii) the mix components of unexpected current accruals.

operations versus accruals information. The operating cash flow measure will represent a unique signal in explaining value not because it has higher valuation than current accruals, but because it is correlated with working capital from operations which is omitted. Evidence of incremental information content of cash flow from operations beyond earnings which imply that cash flow from operations is more highly valued than total accrual does not necessarily imply that there is incremental information content of cash flow from operations beyond working capital from operations which imply that cash flow from operations is more highly valued than current accruals.

The previous model is able to discern if investors are using cash flow and total accruals or just earnings but is not able to discern whether disaggregated disclosures of total accruals into its components, current and non-current accruals, are more informative to investors and whether cash flow from operations is more informative than current accruals. Thus, the issue of whether investors would prefer cash flow from operations and current accruals to be disclosed separately is not answered. Previous studies indicated (see for example Rayburn, 1986; Bernard & Stober, 1989; Jennings, 1990; Pfeiffer et al., 1998) that the information content of earnings is primarily due to the current accruals component. Measuring the relative importance of cash flow from operations over total accruals as a whole makes cash flow from operations possess incremental information content beyond earnings because mixing non-cash movements in assets and liabilities (such as change in receivables, inventories, etc), which constitutes a unique part in accrual accounting and the most informative component of earnings, with non-current accruals in one component gives cash flow an opportunity to complement earnings in explaining value because of the lower information content of non-current accruals which lead to an incremental information content for cash flow from operations beyond earnings and hence differential valuations of cash flow from operations and total accruals in favour of cash flow from operations.

Investigating the incremental information content of cash flow versus earnings may be not enough to judge the usefulness and the relevance of cash flow information for the following reasons: (i) working capital from operations as an intermediate calculation, between earnings and cash flow from operations (that

excludes long-term accruals) can be converted to cash relatively easily and hence can perform the role of cash flow from operations. The majority of the studies considered this measure as an accrual measure which evaluate a firm's liquidity in the time of reporting the statement of changes in financial position prior to firms having to prepare cash flow statement, and (ii) the majority of previous studies on incremental information content of earnings, working capital from operations, and cash flow failed to support, or reported mixed results, regarding the incremental role of cash flow from operations. If the goal is to compare the ability of cash flow from operations versus accrual information to determine the impact of cash flow on valuation, it is necessary to verify if cash flow is even a metric used by the stock market for valuation purposes. In other words, does cash flow have any incremental impact beyond both earnings and working capital from operations on the value of a firm?

To assess whether earnings components are associated with returns differently, models have regressed all three variables, earnings, working capital from operations, and cash flow from operations, in one regression as shown before in the standard model of examining the incremental information content of earnings, working capital from operations, and cash flow from operations. Given (i) the higher valuation of both current accruals and cash flow from operations compared with non-current accruals (this issue has been widely documented see for example Rayburn, 1986; Wilson, 1986 & 1987; Pfeiffer et al., 1998; Pfeiffer & Elgers, 1999), and (ii) the weak evidence on the differential valuations of cash flow and current accruals (see for example Rayburn, 1986; Bernard & Stober, 1989; Jennings, 1990; Pfeiffer et al., 1998), the more direct way to assess whether cash flow has a higher valuation than current accrual is to include only the cash flow from operations and working capital from operations in the regression model.

To sum up, the results of the recent U.S. studies provided evidence of incremental information content of cash flow from operations beyond earnings. This means that cash flow from operations has higher market valuation than total accruals. Given (i) the higher valuation of both current

accruals and cash flow from operations than non-current accruals¹⁶, and (ii) the weak evidence on the differential higher valuations of cash flow over current accruals, there are two possible interpretations of that evidence. One is that cash flow is more highly valued than current accruals. This interpretation supports the decomposition of earnings into its non-current accruals, current accruals, and cash flow from operations components. An alternative interpretation is that cash flow from operations and current accruals are valued equivalently. This interpretation supports the decomposition of earnings into only its non-current accruals, and working capital from operations components. To distinguish between these two alternatives and in order to assess the generality of recent U.S. findings that examine the incremental information content of cash flow from operations and earnings, we examine the incremental information content of cash flow from operations beyond working capital from operations. This issue provides another reason for conducting this study; namely, whether cash flow from operations and current accrual are valued differentially by investors and hence the disaggregating of working capital components into current accruals and cash flow from operations are preferred to disclose separately.

In the light of the above discussion and in order to assess the generality of recent U.S. findings via examining whether the market gives more value to cash flow from operations than current accruals and hence the separate disclosure of cash flow from operations is useful for investors, the following model is estimated¹⁷

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta WC_{it} + \alpha_{2t} \Delta CF_{it} + \varepsilon_{it}$$

¹⁶ Non-current accruals are less valued than both current accruals and cash flow from operations, however, non-current accruals is considered informative component of earnings. See for example: Rayburn (1986), Bowen et al. (1987), Jennings (1990), Pfeiffer et al. (1998), and Pfeiffer & Elgers (1999).

¹⁷Specifically, to examine the incremental information content of cash flow from operations and working capital from operations, we estimate four model: (a) Change model (Model 1), (b) Level and change combined model (Model 2), and (c) Contextual models with a dummy variable approach for measuring the effect of the extremity of working capital from operations on the incremental information content of cash flow from operations whilst controlling for the extremity of cash flow from operations (Model 3 & Model 4). See chapter 5, section 5.4.3 for a full discussion of these four models.

Where: R_{it} is the annual market abnormal returns, ΔWC_{it} is the change in working capital from operations, and ΔCF_{it} is the change in cash flow from operations; for firm i in year t . ε_{it} is the error term. Change in working capital from operations, and in cash flow from operations are deflated by the market value of equity at the beginning of year t . In the previous model, if the coefficient on cash flow from operations is significant, this means that current accruals and cash flow from operations are valued differently and hence the disaggregation of working from operations into cash flow from operations and current accruals components would be preferable to investors. On the other hand, if the coefficient on cash flow from operations is not significant, the disaggregating working capital from operations into cash flow from operations and the current accruals components would have no meaning. This is because these two components will be valued equivalently and would not represent independent signals for the investor.

The previous model is used to assess whether cash flow is more highly valued than current accruals for the following reasons.

1. As shown from the previous discussion, (i) the higher value of both current accruals and cash flow from operations versus non-current accruals, and (ii) the weak evidence on the differential valuations of cash flow and current accruals are widely documented.
2. To be able to assess the effect of extreme working capital from operations on the incremental information content of cash flow from operations whilst controlling for extreme cash flow from operations as well. This represent an extension to previous work in this area that examined the effect of extreme earnings on the incremental information content of cash flow from operations.
3. It will be interesting to see whether working capital from operations, which has been criticised as a poor surrogate for cash flow from operations, has additional explanatory power beyond cash flow from operations.

Regarding 2 above, following the methodology of recent work which examined the effect of extreme earnings on the incremental information content of cash

flow from operations (e.g., Ali, 1994; Cheng et al., 1996; Charitou et al., 2001; Cheng & Yang 2003), this study also extends recent work by examining the effect of extreme working capital from operations on the incremental information content of cash flow from operations to identify whether extreme working capital from operations leads to incremental information content for cash flow from operations. When the information content of working capital from operations is limited by its extreme components the market will look for another measure which has more information content and a good surrogate measure for working capital from operations is cash flow from operations. However, when cash flow from operations is extreme and has less information content, the market will depend upon the primary measure which is working capital from operations irrespective of whether working capital from operations itself is extreme or moderate. On this basis, the study investigates the effect of working capital from operations extremity on the incremental information content of cash flow from operations and working capital from operations and not the opposite case which is the effect of extreme cash flow from operations on the incremental information content of working capital from operations. Consistent with the investigation into the effect of extreme earnings on the incremental information content of cash flow, when the effect of the extremity of working capital from operations on the incremental information content of cash flow from operations is examined, the study controls for the extremity of cash flow from operations itself¹⁸.

Based on the previous discussion, the second objective of this study is to assess the generality of the findings of recent U.S. studies that examine the incremental information content of cash flow and earnings and the effect of extreme earnings on the incremental information content of cash flow via evaluating the usefulness of cash flow from operations in relation with current accruals component by employing testable hypotheses on the incremental information content of working capital from operations and cash flow from operations.

¹⁸ This means that this study isolates extreme cash flow from operations apart from moderate ones when examining the effect of extreme working capital from operations on the incremental information content of cash from operations.

In summary, this study places the incremental information content of three performance measures (i) earnings, (ii) working capital from operations, and (iii) cash flow from operations in sharp focus based upon recent data, a large sample size, actual cash flow figures, and the methodology of recent work on the incremental information content of cash flow from operations and earnings which employed the change and the level as explanatory variables in the regression technique and isolated the extreme components of explanatory variables apart from the moderate ones. This study adopts market-based accounting research (MBAR) to test its hypotheses and to achieve its objectives. The DataStream database is the source of the data. The analysis is conducted on two separate stages as outlined next.

In the first stage, the study investigates the incremental information content of cash flow from operations and earnings to assess whether cash flow from operations and total accruals are valued differentially. This is followed by an examination of the effect of extreme earnings on the incremental information content of cash flow from operations to assess whether extreme earnings lead to incremental information content for cash flow from operations. In the second stage, the study investigates the incremental information content of cash flow from operations and working capital from operations in separate empirical models to assess whether cash flow from operations and current accruals are valued differentially. This is followed by an examination of the effect of extreme working capital from operations on the incremental information content of cash flow from operations to assess whether extreme working capital from operations leads to incremental information content for cash flow from operations.

It should be stressed here that the all three components of earnings: (i) cash flow from operations, (ii) current accruals, and (iii) non-current accruals are informative where the inclusion of each component adds to the informativeness of earnings (see for example, Rayburn, 1986; Bowen et al., 1987; Jennings, 1990 Pfeiffer & Elgers, 1999). The main issue is whether these components are associated with returns differently and hence investors would prefer to observe these components separately or their sum is sufficient. In other words, what is the preferred level of disaggregation for earnings components? Even if cash flow has explanatory power beyond earnings, as conducted by recent U.S. studies, this is

not answering whether current accruals and cash flow from operations are valued differently. To resolve this issue, given the higher valuation of current accruals and cash flow from operations over non-current accruals, examining the incremental information content of cash flow from operations beyond working capital from operations is required¹⁹.

The research problem can be summarized in the following questions:

1. Does cash flow from operations complement earnings in explaining security returns? In other words, does cash flow from operations have explanatory power in explaining security returns beyond earnings? Are cash flow from operations and total accruals valued differently?
2. What are the effects of earnings extremity on the incremental information content of cash flow from operations and earnings? Do extreme earnings lead to incremental information content of cash flow from operations? Are cash flow from operations and extreme total accruals valued differently?
3. Does cash flow from operations complement working capital from operations in explaining security returns? In other words, does cash flow from operations have explanatory power in explaining security returns beyond working capital from operations? Are cash flow from operations and current accruals valued differently?
4. What are the effects of the extremity of working capital from operations on the incremental information content of cash flow from operations and working capital flow from operations? Does extreme working capital from operations lead to incremental information content of cash flow from operations? Are cash flow from operations and extreme current accruals valued differently?

¹⁹ See Jennings (1990) for a discussion on differences between the perspective of the informative earnings components and the perspective of the separate disclosure of earnings components. Following the standard definition from Wilson's study (1987) and Rayburn's study (1986) in chapter 4, section 4.3.1, total accruals consist of current accruals and non-current accruals and equal the difference between earnings and cash flow from operations. Current accruals are the net changes in working capital other than changes in cash, marketable securities, and short term debt. Non-current accruals are discontinued operations, change in deferred taxes, depreciations, amortization, unremitted earnings of unconsolidated subsidiaries, and adjustments for other non-current accruals used to determine earnings.

1.3 Research objectives

This study examines the incremental information content of earnings, working capital from operations, and cash flow from operations. The analysis is conducted in two separate stages. The goal of the first stage is to follow recent U.S. studies that examined the incremental information content of cash flow from operations and earnings and the effect of extreme earnings on the incremental information content of cash flow from operations. The goal of the second stage is to assess the generality of the findings of recent U.S. studies via an examination of the incremental information content of working capital from operations and cash flow from operations followed by an examination of the effect of extreme working capital from operations on the incremental information content of cash flow from operations. These two main goals can be achieved by the following sub –goals:

1. To investigate the incremental information content of cash flow and earnings in order to assess whether cash flow from operations and total accruals are valued differently.
2. To investigate whether extreme earnings lead to incremental information content for cash flow from operations.
3. To examine the incremental information content of cash flow from operations and working capital from operations in order to assess whether cash flow from operations and current accrual are valued differently.
4. To examine whether extreme working capital from operations lead to incremental information content for cash flow from operations.

1.4 Research hypotheses²⁰

To achieve the research objectives, the following sub-hypotheses are tested.

Cash flows from operations versus earnings hypotheses

1. Earnings have incremental information content beyond that contained in cash flow from operations.

²⁰ For the discussion of these hypotheses, see chapter 5, section 5.4.3.

2. Cash flow from operations has incremental information content beyond that contained in earnings.
3. When earnings are extreme, the incremental information content of cash flow from operation exists only for moderate cash flow and not for extreme cash flow.

Cash flow from operations versus working capital from operations hypotheses

1. Working capital from operations has incremental information content beyond that contained in cash flow from operations.
2. Cash flow from operations has incremental information content beyond that contained in working capital from operations.
3. When working capital from operations is extreme, the incremental information content of cash flow from operations exists only for moderate cash flow from operations and not for extreme cash flow.

1.5 Research importance

The users of financial statements now have cash flow information after statement of cash flow become part of the full set of financial statements. Questions remain as to whether this information passes the test of incremental information content; and add explanatory power in explaining security returns beyond that contained in accrual information (earnings and working capital from operations).

Reported numbers are informative if they help investors make more “informed” decisions. If stock prices respond to reported numbers, it is possible to presume that investors’ buy/sell/valuation decisions are influenced by reported numbers and thus that reported numbers “inform” these decisions. Earnings components i.e. operating cash flow, current accruals, and non-current accruals, are incrementally informative (when compared to their total) if they help investors make more informed decisions than would be made with the total alone. For example, if investors believe that current cash flow is more or less informative than current accruals (as predictors of future cash flows), they would like to know these earnings components (rather than just earnings). Determining the preferred level of disaggregations of earnings components will help investors to

improve the outcome of their decisions regarding intelligent investment and credit decisions.

1.6 Contributions of the study

This study makes the following contributions to the incremental information content of cash flow and earnings literature in U.K. First, this study employs actual cash flow data; sample periods of most prior studies on incremental information content of cash flow and earnings used estimated cash flow number from balance sheet and income statements, in addition to, statement of changes in financial position. Second, none of the previous studies examined the effect of earnings extremity on the incremental information content of cash flow and earnings whilst controlling for the extremity of cash flow itself. Third, this study employs a large sample size for a more recent period (1996-2002). The sample size consists of 6851 firm year observations for a sample of 1634 British firms over 7 year periods from (1996 to 2002); sample sizes in most previous studies were smaller hence limiting the generalisability of their conclusions.

As an additional contribution, this study assesses the results of the recent U.S. studies by presenting testable hypotheses on the incremental information content of cash flow from operations and working from operations. Recent U.S. studies that examine the incremental information content of cash flow and earnings showed that cash flow from operations has incremental information content beyond earnings. This means that cash flow from operations and total accrual are valued (associated with returns) differently from each other. Given (i) the higher valuation of both current accruals and cash flow from operations than non-current accruals, and (ii) the weak evidence on the differential higher valuations of cash flow over current accruals, these results are subject to alternative interpretations, either (i) cash flow may be more informative than current accruals, or (ii) both cash flow and current accruals are equivalently informative. The first alternative implies that separate disclosure of cash flow from operations is value relevant whereas the second alternative implies that separate disclosure of cash flow from operations is not value relevant. To distinguish between these two alternatives and in order to assess the generalisability of recent U.S. findings that examine the incremental information content of cash flow from operations

and earnings, we include only cash flow from operations and working capital from operations in the regression models in order to assess whether cash flow from operations and current accruals are valued differentially by investors and hence see whether the disaggregating of working capital components into current accruals and cash flow from operations are preferred by investors to disclose separately. Then, we examine the effect of extreme working capital from operations on the incremental information content of cash flow from operations to assess whether extreme working capital from operations leads to incremental information content of cash flow from operations.

1.7 Structure of the study

The remainder of the thesis is divided into six chapters.

Chapter 2: Cash flow information and evaluation of a firm's financial performance

Chapter 2 evaluates the following. The historical development of cash flow statements by presenting the official pronouncements related to funds statement and cash flow statements issued in the U.S., and U.K., and on the level of the international accounting standard committee. The chapter presents the debate about cash flow accounting and accrual accounting, as well as the reasons for demand for cash flow information. The chapter then reviews some studies into the relation between accrual measures and cash flow measures. This chapter also presents detailed cash flow-based measures which evaluate different aspects of a firm's financial performance such as liquidity, solvency, and profitability of the firm as one of the multiple usages for cash flow information, in addition to, other cash flow ratios which analyse the finance and investment activities and quality ratios which evaluate the quality of income and the quality of sales.

Chapter 3: Studies into the usefulness of cash flow information

The aim of chapter 3 is to provide a review of recent studies regarding the role of cash flow information in two areas (i) bankruptcy and financial failure studies, and (ii) prediction of cash flow studies. Because the main objective of this study is to investigate the incremental information content of earnings, working capital from operations, and cash flow from operations which constitutes a part of the

market-based accounting research (MBAR), this chapter also shows the foundations and the theoretical background to the studies on the incremental information content of cash flow and earnings.

Chapter 4: Prior studies on incremental information content of cash flow and earnings

The main aim of chapter 4 is to provide a review and analysis of prior studies on incremental information of cash flow and earnings in order to develop the research hypotheses, the empirical models, and the methodology employed to examine the incremental information content of earnings, working capital from operations, and cash flow from operations. The review is divided into: (i) early incremental information content studies of cash flow and earnings, and (ii) contemporaneous research on incremental information content of cash flow and earnings. Each includes main U.S. studies, then main U.K. studies, followed by main conclusions. This chapter concludes with an explanation of the contributions of this study.

Chapter 5: Research design and the methodology for testing the incremental information content of earnings, working capital from operations, and cash flow from operations

Chapter 5 discusses the following points: (i) variables definitions, (ii) Data collection and sample selection, and (iii) methodology of testing the incremental information content of earnings, working capital from operations, and cash flow from operations. This research methodology is based upon recent work on the incremental information content of cash flow and earnings which employed an association study methodology over an annual holding period. The development of the recent work, as presented in chapter 4, are represented in using the change and the level of cash flow from operations and earnings as explanatory variables in the regression technique and isolate the extreme cash flow and earnings apart from moderate ones. In the methodology section, the study discusses (1) measuring the dependent variable and return window interval, (2) measuring the independent variables, (3) empirical models and research hypotheses, (4) estimation methods of the empirical models, and (5) robustness checks.

Chapter 6: Empirical results

Chapter 6 focuses on the empirical analysis of the two separate stages of the study. In the first stage, the study presents the empirical results of the incremental information content of cash flow from operations and earnings. This includes the following: (1) change model regression results (Model 1), (2) level and change combined model regression results (Model 2), and (3) the effect of the extremity of earnings on the incremental information content of cash flow from operations and earnings whilst controlling for the extremity of cash flow (model 3 and model 4)²¹. In the second stage, the study presents the empirical results of the incremental information content of cash flow from operations and working capital from operations. This includes the following: (1) change model regression results (Model 1), (2) level and change combined model regression results (Model 2), and (3) the effect of the extremity of working capital from operations on the incremental information content of cash flow from operations and working capital from operations whilst controlling for the extremity of cash flow from operations (model 3 & model 4)²². Chapter 6 concludes with discussion and a summary for the results of the study.

Chapter 7: Summary and conclusions

This chapter provides a summary of the results and recommendations for future research.

²¹ See chapter 5, section 5.4.3 for a full discussion of these four models.

²² See chapter 5, section 5.4.3 for a full discussion of these four models.

Chapter 2: Cash flow information and evaluation of a firm's financial performance

2.1 Introduction

2.2 The historical development of the cash flow statement

2.2.1 The all-financial resources concept

2.2.2 The working capital concept

2.2.3 The cash concept

2.3 Accrual earnings versus cash flow

2.3.1 Cash flow accounting

2.3.2 The demand for cash flow information

2.4 Prior studies on the relation between accrual measures and cash flow measures

2.5 Cash flow-based measures used for evaluating a firm's financial performance

2.5.1 Cash flow-based liquidity measures

2.5.2 Cash flow-based solvency measures

2.5.3 Cash flow-based profitability measures

2.5.4 Other cash flow-based measures

2.5.5 The quality ratios

2.6 Summary

Chapter 2: Cash flow information and evaluation of firm's financial performance

2.1 Introduction

The aim of this chapter is to review the historical development of cash flow statements and to present the financial measures which can be computed depending upon cash flow information to evaluate different aspects of a firm's financial performance, such as, liquidity, solvency, and profitability. Cash flow-based measures used for evaluating a firm's financial performance represent one of the multiple uses for cash flow information²³. In order to understand the construction and interpretation of the measures developed from cash flow statements, an explanation of cash flow statements and their objectives is required.

Accrual-based measures, derived from accrual accounting, are considered the original measures for evaluating the financial performance. Cash flow-based measures are considered as complementary to accrual-based measures. Therefore an accrual versus cash flow controversy exists. The disclosure of cash flow information has been supported by several studies in that cash flow statements convey additional information over accrual accounting for the users of financial statements²⁴.

This chapter is organised as follows. Section 2 provides the historical development of cash flow statements. Section 3 discusses accrual earnings versus cash flow. Section 4 shows previous studies on the relation between accrual measures and cash flow measures. Section 5 presents cash flow-based measures which evaluate the financial performance of the firm. Section 6 concludes the chapter.

²³ See section 2.5 in this chapter, cash flow-based measures used for evaluating a firm's financial performance. For other useful usage of cash flow information see chapter three which presents three main areas of the usefulness of cash flow information: (i) cash flow information and bankruptcy studies, (ii) cash flow information and prediction of cash flow studies, and (iii) cash flow information and capital market studies.

²⁴ See chapter 4 for an evaluation of the usefulness of cash flow information from the perspective of capital market.

2.2 The historical development of the cash flow statement

In the Statement of Financial Accounting Concepts (SFAC) No.1: Objectives of Financial Reporting by Business Enterprises, the Financial Accounting Standards Board (FASB) asserts that financial reporting should provide information about the cash flow of the firm. The FASB states that:

“Financial reporting should provide information to help investors, creditors, and other assess the amounts, timing, and uncertainty of prospective net cash inflows to the related enterprise” (Para. 37).

In its statement of principles, the Accounting Standards Board (ASB) asserts the importance of cash flow information in helping the users of financial statements to take their decisions. The ASB stated that²⁵:

"The economic decisions that are taken by users of financial statements require an evaluation of the ability of an enterprise to generate cash and of the timing and certainty of its generation ... Users are better able to evaluate this ability to generate cash if they are provided with information that focuses on the financial position, performance and cash flow of an enterprise" (Para. 15).

Many authorities responsible for setting corporate reporting standards in national regulatory bodies and the International Accounting Standards Committee (IASC) have supported the disclosure of cash flow information beside the two traditional accounting statements; namely, the balance sheet and income statement (or profit and loss account) (Garrod & Hadi, 1998).

For decades, the academic community and the accounting profession have argued that accrual accounting provides vital information to the different users of financial statements. On the other hand, the financial analysts, lenders, academic researchers and the accounting profession continued to urge the standard setting bodies to obligate firms to prepare cash flow statement as a part of their financial reports. As a result, in November 1987 the Financial Accounting standards Board (FASB) released the statement of cash flows (SFAS No.95). In 1991 the Accounting Standards Board (ASB) in U.K. issued cash flow statement (FRS No.1), and in 1992, the International Accounting Standards Committee (ISAC) issued cash flow statement (ISA7). The financial community adopted the concept of comprehensive cash flow reporting, particularly for evaluating the results of

²⁵ Source: Garrod and Hadi (1998).

operations, because of the belief that traditional measures of income and working capital from operations are not a good surrogate for cash flow from operations (Drtna & Largay, 1985).

Historically, cash-basis accounting preceded accrual accounting. Accountants fought for many years to gain the acceptance of the measurement of income on the accrual basis (Heath, 1987). Contemporary accounting began with merchants who, centuries ago, defined net income as the differences between cash receipts and cash payments. The concepts of receipts and payments were refined over time to those revenues and expenses. Consequently, the definition of net income was defined as the difference between revenues and expenses (Coughlan, 1964). There are two main reasons for the difference between net income and cash flow for the period (Davidson et al., 1979, Chapter 5).

1. The first reason is the point of recognition of expenses and revenues. The cash flow basis recognises inflows when cash is received even if not earned and it recognises outflows when cash is paid even if not incurred. But accrual basis recognises revenues when the firm provides goods and services to customers even if the collection of the cash will be later and it recognises expenses when the firm uses the goods or services provided by suppliers.
2. The second reason is that the firm makes some transactions which are not related directly to the earnings process and these transaction lead to cash inflows or cash outflows. For example, the firm receives cash from issuing of additional bonds or additional capital stock and the firm pays cash for the dividends or for purchasing new assets.

The term 'fund' is a general term which can have different meanings according to the users of financial statements. The concept of fund which will be used will influence the name of the statement which discloses cash flow information, the format of this statement and the nature of disclosed cash flow information via this statement. A brief review of the history of cash flow statements indicates that there are three major concepts of funds (Coughlan, 1964): (i) the all-financial resources concept, (ii) the working capital concept, and (iii) cash concept. These

three concepts are discussed next with fuller treatment given to the cash concept given that this is used currently for preparing the cash flow statement.

2.2.1 The all-financial resources concept

This concept of the fund represented the preliminary step to disclosing cash flow information. The all-financial resources concept regards funds as pools of all assets and claims; so that a purist report could simply summarise movements on all accounts (Egginton & O'Shea, 1989). In the past and according to this concept of funds, the accountants were accustomed to preparing the statement of sources and application of funds. The statement of sources and application of funds takes all the changes in the accounts of the balance sheet for a year, and classifies them into two groups. These are the sources (the credit changes) and the application (the debit changes) and by adding the amount of the change of each account from the same group we can reach the total sources of funds and total application of funds. The preparation of the sources and application of funds statement in this way did not provide any information regarding cash flow and what this concept is intended to portray was not clear (Coughlan, 1964).

2.2.2 The working capital concept

This concept of fund represented the second step to disclosing cash flow information, when the fund is defined as working capital, according to this concept of fund, accountants prepared the statement of changes in working capital or funds statement or a statement of changes in financial position.

The statement of changes in financial position, according to this concept of fund, was to explain the change in working capital, the increases in working capital represent the sources of fund and the decreases in working capital represent the uses of fund. Working capital was defined as the difference between current assets and current liabilities. The main sources of fund which represent the increases in working capital are: (i) positive working capital from operation, (ii) issuance of long-term debt or capital stock, and (iii) sale of non-current assets. The main uses of fund which represent the decreases in working capital are: (i) dividends, (ii) redemption of long-term debt or capital stock, and (iii) acquisition of non-current assets

The objective of the statement of changes in financial position was to evaluate a firm's liquidity and to evaluate the changes in the structure of the assets and the equity of the firm by reporting on the flows of funds into and out of the firm during the financial period (Davidson et al., 1979, Chapter 5). The amount of working capital at a particular time represents the excess of cash and near-cash assets over near-term claims on these liquid assets. The sources and uses of working capital presented in the statement of changes in financial position might be classified as being related to: (i) operating activities, (ii) investing activities, and (iii) financing activities. Working capital from operating activities indicates whether the earning activities of the firm (that is, acquiring and selling good or services) have resulted in an increases or decreases in working capital.

In the U.S., the official pronouncements on funds statements passed through the following stages.

- In 1961, the American Institute of Certified Public Accountants (AICPA) considered a research study on cash flow analysis and the funds statement. The study recommended that "the funds statement should be treated as a major financial statement. It should be presented in all annual reports of corporations and be covered by the auditor's short-form report" (P. 90).
- In 1963, The Accounting Principles Board (APB) issued opinion No.3: the statement of source and application of funds, to recommend (but not require) firms to prepare fund statement (Davies et al., 1999, Chapter 26).
- In 1970, The Security Exchange Commission (SEC) made the funds statement an obligatory element of financial statement (Davies et al., 1999, Chapter 26).
- In 1971, the Accounting Principles Board (APB) issued opinion No. 19: Reporting Changes in Financial Position, to obligate the firms to prepare the statement of changes in financial position and to form a basic financial statement that should be issued together with a balance sheet and an income statement (Ketz & Largay, 1987; Golub & Huffman, 1984).

The previous two opinions of the Accounting Principles Board (APB) gave the right to firms to define funds as working capital or cash. However, the majority of the firms were preparing the statement of changes in financial position according to the working capital concept.

In the U.K., the Accounting Standards Committee (ASC) in 1975 issued Statement of Standard Accounting Practice (SSAP) 10: Statement of Source and Application of Funds, which obligated the firms to prepare the statement of sources and application of funds. This statement focused on working capital movements (Blake, 1997, Chapter 2). In 1977 the International Accounting Standards Committee (IASC) issued the International Accounting Standard (IAS) No. 7: Statement of change in financial position which obligated all firms to prepare the statement of change in financial position. (IAS) No. 7 defined funds as working capital.

Opinion No. 19 allowed two methods of reporting working capital from operations (Heath, 1987): the direct and the indirect method. If the direct method is used, actual sources and uses of working capital are reported. If the indirect method is used, the presentation starts with net income, and then adding or subtracting the items which do not impact on working capital (such as depreciation and amortization expenses, deferred tax expenses, and so forth).

In the indirect method, working capital from operations is computed as follows (Drtina & Largay, 1985).

Table 2-1 Working capital from operations under the indirect method; Source: Drtina & Largay (1985, P. 315)

	Income from continuing operations
+	depreciation, depletion, and amortization expense (expense, no cash paid)
+	deferred income tax expense (expense, no cash paid)
-	undistributed equity method income (revenue, no cash received)
+ (-)	amortization of discount (premium) on bonds payable [expense (revenue), no cash paid (received)]
=	Working capital from operations

The main disadvantage of using working capital as a definition of the fund and hence as a basis for preparing the statement of changes in financial position is that working capital may not be indicative of cash flow; the business community has experienced situations where working capital provided by operations has been positive while cash provided by operations has been negative (Golub & Huffman, 1984).

The common agreement among the users of financial statements is that the statement of change of financial position when prepared by using the working capital concept did not achieve its objectives for the following reasons (e.g., Fess, 1966; Coughlan, 1964).

1. There is some inconsistency in the classification of the items of working capital. For example, the inclusion of a three-year prepaid insurance premium as a current asset and excluding machinery and equipment having a three-year life.
2. Some of the items classified as current assets, such as inventories, account receivables, and current liabilities have characteristics of fixed properties because these items will be replaced by other items in a continuing cycle.
3. Although working capital has been thought to satisfy the claims of bankers or creditors but only cash will satisfy these claims not any other items from working capital.
4. "The problem of the proper "valuation" of current assets and current liabilities for purposes of working capital analysis become more apparent if the valuation presently assigned to the individual items of current assets and current liabilities are critically examined. For example, some of the current assets may be stated at cost (prepaid items), some may be reflected at market value (marketable securities), some may be stated at a lower of cost or market value (inventories), some at realizable value (accounts receivable less allowance for doubtful), and some at current value (cash). This inconsistent valuation can only weaken the validity of working-capital analysis" (Fess, 1966, P. 268).

2.2.3 The cash concept

This concept of the fund represents the final step to disclose cash flow information. According to cash as a concept of fund, the accountants prepare a statement of cash flow. The cash flow statement explains the changes in the cash balance from the beginning to the end of the financial period and reflects only those transactions which result in an increase or decrease in cash.

Several strong reasons have led to the adoption of the cash concept instead of the working capital concept. These reasons can be summarised as follows.

1. The limitations, mentioned above, of the working capital concept as a definition of funds.
2. The increased numbers of bankruptcies of large companies which reveal that working capital from operations disclosed via statement of changes in financial positions provide insufficient information to evaluate a firm's liquidity and solvency²⁶.
3. A funds statement prepared under SSAP 10 was largely a reconciliation of balance sheet changes, rather than a statement which provided additional useful information to the user of financial statements (Davies et al., 1999, Chapter 26).
4. The Accounting Principles Board (APB) in opinion No. 19: Reporting Changes in Financial Position, allowed either a cash or working capital concept for the statement in changes in financial position. This led to less comparability and consistency of information on the firm's cash flow.
5. The variety of definitions of funds ranging across the whole spectrum of liquidity, from cash at one extreme to total resources at the other, make the term 'funds' have different meanings for different users (Heath, 1978). On the other hand, the perceived value of the cash flow statement is that its standardisation makes comparisons between firms more reliable due to the consistency in preparing this statement via using only one concept of funds which is cash.

²⁶ For more details about this point see section 2.3.2.1. in this chapter.

In the U.S., the official pronouncements on cash flow statement passed through the following stages.

- In 1978, the Financial Accounting Standards Board (FASB) issued Statement of Financial Accounting Concepts (SFAC) No.1: Objectives of Financial Reporting by Business Enterprises. SFAC No. 1 asserted that financial reporting should provide information about the cash flow of the firm (Para. 37).
- In 1980, the Financial Accounting Standards Board (FASB) issued a Discussion Memorandum on Reporting Funds Flows, Liquidity, and Financial Flexibility. The memorandum's main objectives were to review opinion No. 19: Reporting Changes in Financial Position, and to examine the need for information about funds flow. The Discussion Memorandum discussed issues relating to how information about funds flow, liquidity, and financial flexibility is useful, what information would be most useful, and how the information should be presented (PP. i: ii).
- In 1981, the Financial Accounting Standards Board (FASB) issued an exposure draft of a proposed Statement of Financial Accounting Concepts: Reporting Income, Cash Flows, and Financial Position of Business Enterprises. This exposure draft supported using the cash concept instead of working capital concept to disclose cash flow information (Golub & Huffman, 1984).
- In 1984, the Financial Accounting Standards Board (FASB) issued Statement of Financial Accounting Concepts (SFAC) No.5: Recognition and Measurement in Financial Statements of Business Enterprise recommended making a statement of cash flow as a part of the full set of financial statements (Para. 13).
- In 1987, the Financial Accounting Standards Board (FASB) released Statement of Financial Accounting Standard (SFAS) No.95: Statement of Cash Flows. This superseded opinion No. 19: Reporting Changes in Financial Position and requires that a business enterprise should provide a statement of cash flow for each period for which results of operations are

provided (Para. 3). SFAS No. 95 defined cash to include cash equivalents with maturities of 90 days or less, such as treasury bills, commercial paper, and money market funds (Zeller & Stanko, 1994).

The FASB suggested this statement to assess (Carslaw & Mills, 1991):

1. The ability of the firm to generate future positive cash flows.
2. An enterprise's ability to meet its obligations and pay dividends, and its needs for external financing.
3. The reasons for differences between net income and associated cash receipts and payments.
4. The effects on an enterprise's financial position of both its cash and non-cash investing and financing transactions during the period.

In the U.K., the Accounting Standards Board (ASB) in 1991 issued the Financial Reporting Standard (FRS) No.1: Cash Flow statements. FRS No.1 requires a cash flow statement to be included in all financial statements that are intended to give a true and fair view of the reporting entity's financial position and profit or loss, unless the entity is specifically exempted from producing a statement by the standard (Wild & Goodhead, 1993). According to FRS No.1, cash flow was to be classified under five standard headings. In 1996, the Accounting Standards Board (ASB) issued a revised version of FRS No.1, extending the analysis of cash flow to eight headings. In the U.K. the replacement of a funds flow statement with a cash flow statement is effectively a move from a working capital concept to cash concept (Green 1999).

In 1992, the International Accounting Standards Committee (IASC) revised the International Accounting Standard (IAS) No. 7: Cash Flow Statements. IAS No. 7 obligated all firms to prepare a cash flow statement, instead of a statement of changes in financial position, as an integral part of its financial statements for each period for which financial statements are presented (International Standards Committee, 2000). Both SFAS No. 95 and FRS No.1, as well as (IAS) No. 7, have defined cash as cash and cash equivalents.

Under SFAS 95, the statement of cash flow reports cash receipts and payments by operating, financing, and investing activities. The classification of cash flow

into operating, financing, and investing activities is essential for the analysis of cash flow data (White et al., 2001, Chapter 3). Operating activities are the earnings-related activities of a firm. Examples include (i) cash collection from customers, (ii) cash paid to supplier of goods, and (iii) cash paid to employees. Investing activities are means of acquiring and disposing of non-cash assets. Examples include (i) cash paid for property, plant, and equipment, and (ii) cash received from the sale of property, plant, and equipment. They also include lending funds and collecting the principal on these loans. Financing activities are means of contributing, withdrawing, and servicing funds to support business activities. They include resources and contributions from creditors and owners and repaying to them as dividends for the owners and repaying of principal amounts borrowed from creditors (Wild et al., 2003, chapter 7).

There are two methods for reporting cash flow from operation; namely, the direct method and the indirect method. The direct method reports the actual sources, cash received from customers, and uses of cash, cash paid for suppliers, taxes, general and administrative costs and so forth. The cash flow from operation is the difference between sources and uses. The indirect method reconciles the net income with deferred and accrued revenues and expenses such as depreciation, amortization, increases or decreases in deferred revenue, and so on (Heath, 1987). This method backs into cash flow from operations by (1) removing the effects of accruals, deferrals, and allocations which produced revenues or expenses but did not provide or use cash ; and (2) adjusting for operating sources and uses of cash which did not produce revenues or expenses (Drtina & Largay, 1985). The FASB requires firms to disclose information about components of cash flow from investing activities, and cash flow from financing activities, and encourages (recommends) firms to disclose information about components of cash flow from operations (the direct method).

In the direct method, cash flow from operations is computed as follows (Drtina & Largay, 1985).

Table 2-2 Cash flow from operations under the direct method Source; Drtina & Largay (1985, P. 315)

	Cash Collected From Customers
+	Cash received from dividends and interest
-	Cash paid for inventories, services, other operating expenses, and taxes
=	Cash Flow from operations

In the indirect method, cash flow from operations is computed as follows (Drtina & Largay, 1985).

Table 2-3 Cash flow from operations under the indirect method; Source: Drtina & Largay (1985, P. 315)

	Income from continuing operations
+	depreciation, depletion, and amortization expense (expense, no cash paid)
+	deferred income tax expense (expense, no cash paid)
-	undistributed equity method income (revenue, no cash received)
+ (-)	amortization of discount (premium) on bonds payable [expense (revenue), no cash paid (received)]
=	Working capital from operations
-	Increase in accounts receivable (revenue, no cash received)
-	Increase in inventories (cash paid, no expense)
-	Increase in prepayments (cash paid, no expense)
-	Decrease in accounts payable (cash paid, no expense)
-	Decrease in accruals and other current liabilities (cash paid, no expense)
+	Decrease in accounts receivable (cash received, no revenue)
+	Decrease in inventories (expense, no cash paid)

+	Decrease in prepayments (expense, no cash paid)
+	Increase in accounts payable (expense, no cash paid)
+	Increase in accruals and other current liabilities (expense, no cash paid)
=	Cash flow from operations

Under the indirect method cash flow from operations is computed by adjusting net income for all the following (White et al., 2001, Chapter 3).

1. Non-cash revenues and expenses (for example, depreciation expense)
2. Non-operating items included in net income (for example, gains from property sales)
3. Non-cash changes in operating assets and liabilities (operating changes in receivables, payable, etc).

There has been considerable debate over the costs and benefits provided by the direct and indirect methods of reporting cash flow from operations. The main advantage of the direct method is the ability to compare cash flow from operations components among firms and for the same firm over time. The main advantage of the indirect method is to highlight the difference between net income and cash flow from operations, as well as, this method is less costly to implement. The majority of firms prefers and applies the indirect method. However, the empirical results of the studies on the different cash flow from operations display methods support for the direct method²⁷.

Under FRS No.1, the cash flow statement should include all the reporting entity's inflows and outflows of cash and cash equivalents classified under eight standard headings²⁸ (Blake, 1997, Chapter 2).

1. Operating activities;
2. Return on investments and servicing of finance;
3. Taxation;
4. Capital expenditure and financial investment;

²⁷ For more details about the comparative advantages of the direct and indirect methods see for example Klammer & Reed (1990), Monsen (2001), and Kwok (2002).

²⁸ For more details about these eight standard heading see Davies et al., (1999).

5. Acquisitions and disposals;
6. Equity dividends paid;
7. Management of liquid resources; and
8. Financing.

Both SFAS No. 95 and FRS No.1 allowed either the indirect or direct method for the preparation of cash flow statements. However, if the information on cash flows is presented by the direct method, the firm should disclose a reconciliation of net income to cash flow from operations in a separate schedule. Non-cash transactions are reported in a separate schedule of non-cash investing and financing activities (e.g., conversion of debt to equity).

Under SFAS No. 95, interest income and dividends received from investments in other firms are classified as operating cash flow; interest payments are classified as operating cash outflows (White et al., 2001, chapter 3).

SFAS No. 95 has been criticised for the following reasons (Wild et al., 2003, chapter 7).

- Practice does not require separate disclosure of cash flow pertaining to either extraordinary items or discontinued operations.
- Many users consider interest paid a financing outflow, not operating outflows, and interest and dividends received as cash inflows from investing activities, not operating inflows.
- Income taxes are classified as operating cash flows. This classification can distort our analysis of the three individual activities if significant tax benefits or costs are attributed to them in a disproportionate manner.
- Removal of pre-tax (rather than after-tax) gains or losses on sale of plant or investments from operating activities distorts the analysis of both operating and investing activities. This is because their related taxes are not removed, but left in total tax expenses among operating activities.

Under FRS No.1, interest income, dividends received from investments in other firms, and interest paid are classified under a unique standard heading and are not considered part of cash flow from operations. furthermore, dividends paid are

classified under a unique standard heading and are not considered part of cash flow from financing. This format is superior to the SFAS 95 format.

Table 2-1 depicts the main differences among the requirements of FRS 1, SFAS 95, and IAS 7.

Table 2-4 the main differences among the requirement of IAS 7, FRS 1 revised 1996, and SFAS 95. Adapted from: White et al. (2001, P. 98)

Issue	UK (FRS1 revised 1996)	US (SFAS 95)	ISA (ISA 7)
Interest and dividends received	Grouped in a separate category	CFO	May be shown either CFO or CFI
Interest paid		CFO	May be shown either CFO or CFF
Dividends paid	Grouped in a separate category	CFF	May be shown either CFO or CFF
Taxation	Grouped in a separate category	CFO	CFO
Reconciliation from net income to CFO	Always required	Always required	Not required when direct method used

Where:

- CFO
- Cash flow from operations
- CFI
- Cash flow from investing activities
- CFF
- Cash flow from financing activities

2.3 Accrual earnings versus cash flow

The reporting of cash flow information via cash flow statements rests on the premise that this information is informative to investors.

Wild et al. (2003, chapter 7) argued that the statement of cash flows provides information to help the user of financial statement to assess liquidity, solvency and to address questions such as the following.

1. How much cash is generated from or used in operations?
2. What expenditures are made with cash from operations?
3. How are dividends paid when confronting an operating loss?
4. What is the source of cash for debt payments?
5. What is the source of cash for redeeming preferred stock?
6. How is the increase in investments financed?

7. What is the source of cash for new plant assets?
8. Why is cash lower when income increased?
9. What is the use of cash received from new financing?

White et al. (2001, Chapter 3) suggest that cash flow statement is intended to provide more objective information about:

1. A firm's ability to generate cash flow from operations.
2. Trends in cash flow components and cash consequences of investing and financing decisions.
3. Management decisions regarding such critical areas as financial policy (leverage), dividends policy, and investment for growth.

Hussey & Bence (1992) interviewed 21 investment analysts with a specific interest and responsibility in the health and household sector, regarding whether they considered that the cash flow statement is an improvement on the funds flow statement. Their findings showed that about 71% (15 analysts) preferred the cash flow statement to the funds flow statement. Their main reasons for preferring the cash flow statement were:

1. It aids factual prediction.
2. It gives a better guide to where the money has been used.
3. It contains more information.
4. It is a more standardised approach than the fund flow statement.
5. It enables users to see whether the company is self-financing.
6. It removes non-cash items.
7. It is easier to understand.

Jones et al. (1995) surveyed the usefulness of cash flow statements of 210 public firms listed on the Australian stock exchange. Their findings showed that (i) the cash flow statement is superior to the funds statement for evaluating liquidity and solvency factors, (ii) cash flow statements are significantly more useful than funds flow statements in the evaluation operating performance, managerial performance, overall firm's performance, and performance comparisons with other firms and (iii) funds flow statements are viewed as inferior to cash flow

statements for monitoring working capital change, monitoring fixed asset investment, and predicting future cash flow and financial distress.

If a firm is to continue operating effectively over several years, the operating activities must generate sufficient cash flow from operations so that inventory can be replaced, creditor's claims can be paid, and plant and equipment can be replaced as they wear out. Cash flow provided (or used) by operation is therefore an important indicator of the firm's financial health, particularly when such cash flow from operations is assessed over several years.

Cash flow statements provide clear information about some transactions that are difficult to observe by looking at either the income statement or the balance sheet. Examples of these transactions are acquisitions and sales of specific types of non-current assets and issues and redemption of long-term debt and capital stock. The following two points focus on cash flow accounting and the reasons for the demand for cash flow information.

2.3.1 Cash flow accounting

Accrual accounting facilitates the evaluation of a firm's performance and is essential to the matching of revenues and expenses. However, the efficiency of the accrual system has been questioned due to the allocations and arbitrary problems inherent in accrual accounting (Belkaoui, 2004, chapter 8). The following quotations illustrate these problems.

"Unfortunately, the earnings concept is constructed as a residual, after all cash and non-cash items are put together. Non-cash items, which are relatively "soft" and ambiguous, are mixed with cash items, which are relatively "hard" and objective. Like adding miles to inches, such a mixture has an effect of reducing the reliability of the resulting figure" (Ijiri, 1980, P. 55).

"Most advocates of cash-flow accounting feel that the problems of asset valuation and income determination are so formidable that they warrant the derivation of a separate accounting system and propose the inclusion of a comprehensive cash-flow statement in company reports" (Belkaoui, 2004, P.280).

The proponents of cash flow accounting view that cash flow accounting avoids the problem of asset valuation and income measurement. Hence, it can provide a

reliable guide regarding the past performance of the firm and how the firm is likely to perform in the future (Ashton, 1976).

Lee (1981) defined cash flow accounting as follows.

"Cash flow accounting describes the realization and utilization of cash. That is, the conversion of non-cash resources into cash and the use of cash funds generated from various sources to acquire resources and meet obligations" (P. 164).

Ashton (1976) described cash flow accounting as follows.

"Under a comprehensive cash flow accounting system, entries would only be made in the books of account when cash was actually received or paid out. This means that fixed assets and materials purchased for either resale or further processing would be charged in full to the year in which they were acquired irrespective of when the benefits from acquiring these assets will accrue. From purely a book-keeping point of view historic cost accounting is very similar to cash flow accounting except that cash flow accounting would not incorporate any valuations and would ignore funds items such as debtors and creditors" (P. 63).

Lawson (1973) viewed cash accounting as superior to conventional accrual accounting for the following reasons.

1. The recording of all payments and receipts as cash flow is a necessary preliminary to the inclusion of the time value of money as one of the costs of resource utilisation.
2. A cash-flow system of accounting facilitates completely objective financial reporting. For example, the problems of stock valuation and the calculation of depreciation no longer arise where such items are accounted in terms of cash flow in the accounting periods in which they are actually converted into cash.
3. The cash-flow system automatically copes with inflation in any particular year to the extent that all in-flows and out-flows of cash are stated in terms of a common yardstick of value.

Jones et al. (1995) mentioned several reasons for the superiority of cash flow accounting over accrual accounting.

1. Cash flow accounting does not rely on allocation procedures used in accrual accounting, and thus provides a relatively unambiguous measure for the evaluation of a firm's performance.

2. It avoids some of the problems associated with changing price levels which can distort conventional cost accounts.
3. It emphasises the fundamental importance of cash resources, and solvency and liquidity issues to the continuing life of the firm.
4. It is capable of producing data needed for a wide variety of decisions and control activities both within and outside the reporting entity.
5. It has many benefits because of its relative simplicity, objectivity, and understandability.

The developments of cash flow accounting have been closely associated with the work of Lee and Lawson²⁹. Lawson's work (1971) and Lee's work (1972) represented the earliest work on cash flow accounting. These earlier works were followed by other developments on cash flow accounting by Lee (1981 and 1984) and Lawson (1985).

Lawson (1971) suggested preparing multi-period cash flow statements which cover between five or six years prior to the current period and between seven and ten years for the future. The bottom line of his proposed cash flow statement is shareholders' cash-flow stream which is defined as the difference between distributable equity cash flow (total dividends) and external equity finance. The shareholders' cash-flow stream for each year is then discounted by the firm's cost of capital. In this way, Lawson incorporated the principles of discounted cash flow based upon that the value of the firm's equity is the discounted future value of forecasted dividends that the firm expects pay out during the period covered by the forecast (Ashton, 1976).

Lee (1972) suggested a cash flow reporting system which incorporates both actual and forecasted cash flows; these forecasts cover four to five years. This system includes a main statement which is a statement of total cash flow. This main statement starts with the balance of the cash in the beginning of the period and ends with the balance at the end of period. Between these two balances there are the all-cash transactions which reflect the change in cash during the period. In addition to this main statement, there are several separate statements showing

²⁹ See also Ijiri (1978) for other work on cash flow accounting.

the details of some lines appearing in the total cash flow statement; such as operational transactions flow, financial transactions flow, and capital transactions. According to Lee, this system should satisfy, among other things, three main needs of the users of financial statements.

1. To predict dividends and other benefits receivable by the user from the firm.
2. To predict the firm's future survival, maintenance or expansion.
3. To predict the degree of risk and uncertainty connected with an existing or potential investment in a firm.

Ashton (1976) argued that the main limitations of the early work on cash flow reporting of both Lawson's work (1971) and Lee's work (1972) was the low accuracy of forecasts with cash flow numbers in conditions of rapid technology and economic change.

Lee (1981 and 1984) proposed a link between net realisable value accounting³⁰ and cash flow accounting. He described how cash flow accounting and net realisable value accounting data can be brought together in a series of articulated financial reporting statements which provide more relevant information for the user of financial statements about cash and cash management than can be given in either cash flow accounting or net realisable value accounting alone.

Lee defined net realisable value accounting as follows.

"Net realizable value accounting describes, within aggregate totals, a mixture of both the realisation and utilisation of cash (as in cash flow accounting), and the pre-realisation changes in the net realisable values of non-cash resources and the amounts due on various obligations" (P. 164).

To achieve the link between both systems, Lee suggested the segregation of net realisable value in his proposed statement, among other statements³¹, titled with statement of total cash flow into realised cash flow and unrealised cash flow. Realised cash flow is described in detail in cash flow accounting, and unrealised

³⁰ Net realisable value refers to the amount of cash or cash-equivalent that would be obtained by selling the asset currently or that would be paid to redeem the liability currently (Belkaoui, 2004, Chapter 16). For more details about net realisable value accounting see Belkaoui (2004, Chapter 16).

³¹ For more details about these statements see Lee (1981 & 1984, chapter 5).

cash flow is represented by the changes in the net realisable value of non-cash assets and changes in the amounts of reported obligations. He then divided unrealised cash flow into (i) readily–realisable cash flow such as the change in the net realisable value of debtors (ii) not readily–realisable cash flow such as the change in the net realisable value of work in progress, and (iii) non-realisable cash flow such as change in the net realisable value of specialist plant and machinery. Lee argues the segregation of net realisable value in order of realisability and repayment provides the users with (i) indications of what cash is or will be available for future activities and commitments of the firm, and (ii) assessing to the varying degrees of credibility inherent in such information.

Egginton (1985) criticised Lee's work positing that net realisable value is neither cash nor flow. He argued that "it is dangerous to call realisable profit a measure of total cash flow, or the statement containing it 'one of cash flow'" (P. 110).

Clubb (1993) argued that the difficulty and cost of providing the desired current value data is probably the main obstacle to the development of such an integrated financial reporting system.

Lawson's (1985) proposed cash flow identity model. Lawson's identity is as follows.

$$\text{Entity cash flow} = \text{shareholder cash flow} + \text{lender cash flow}$$

Where

Entity cash flow = operating cash flow – investments cash flow – taxes paid – liquidity change

Shareholder cash flow = Dividends – new equity receipts

lender cash flow = Interest payment - borrowing

According to Lawson, operating cash flow applications are taxes paid, net capital expenditures, and liquidity changes. Any surpluses or deficits flow to or from lenders or shareholders (Aziz & Lawson, 1989). The left hand-side provides useful information to three decision areas: (i) sales and production, (ii) capital

investment, and (iii) liquidity. The right hand-side provides information on dividends and debt-equity financing policies.

The ex-ante multi-period version of Lawson's identity is basic to the theory of corporate valuation which may be stated as follow.

Total market value = market value of debt + market value of equity

Or

The present value of expected entity cash flow (after tax) = present value of
expected lender cash flow + present value of expected shareholder cash
flow

From the above identities, it can be inferred that a firm is financially viable and has a market value as a going concern, if on a continuing basis it generates positive entity cash flow (after net capital expenditure) and holds out the prospect of continuing to do so (Aziz et al., 1988).

2.3.2 The demand for cash flow information

There are several reasons³² which may clarify the demand for reporting cash flow information via a cash flow statement. This section deals with two main reasons: first, to evaluate a firm's liquidity and solvency, second, to evaluate the quality of income.

2.3.2.1 Evaluate firm's liquidity and solvency

The accrual method of financial reporting was not sufficient to provide critical information about the liquidity and solvency of the firm. Dividends, debt, interest, and all cash expenses are paid with cash, not profit. Hence, the users of financial statements need additional cash flow information to judge a firm's

³² For other reasons of the demand for cash flow information see chapter three which presents three main areas of the usefulness of cash flow information: (i) cash flow information and bankruptcy studies, (ii) cash flow information and prediction of cash flow studies (iii) cash flow information and capital market studies. Also, for other useful usage of cash flow information see section 2.5 in this chapter: cash flow-based measures used for evaluating firm's financial performance

liquidity and solvency. The large number of financial failures has proved that accrual information has failed to provide the critical information required to predict a firm's liquidity and solvency even by using the measure of working capital from operations. The accounting literature review provides us with many examples of the shortcoming of accrual-based measures when used alone in evaluating a firm's performance. There are firms which appear to be successful from the viewpoint of accruals-based measures, but these faced the problem of bankruptcy and, ultimately, liquidation.

An example (Largay & Stickney, 1980) of the danger of depending only upon accrual-based measures is the case of the American company, W.T. Grant, a retailer, which faced bankruptcy and, ultimately, liquidation. Whereas accrual-based measures and ratio analysis of the financial statement of this company would not have revealed the existence of many problems before the liquidation, the careful analysis of the company's cash flows would have revealed multiple problems regarding the performance of this company a decade before its collapse. Yet a very short period before the bankruptcy, Grant's shares were selling at nearly 20 times earnings and the working capital from operations was at an acceptable level.

A study applied in 1985 on U.S. firms found that 60% of the 45,000 closely-held firms filing bankruptcies in 1985 were profitable (Emmanuel, 1988). Charitou & Venieris (1990) investigated 60 Greek firms over the period from 1981-1983. They found that careful analysis of several Greek bankrupt firms' cash flow, among these Barko and Avrassoglou, could have indicated liquidity and solvency problems several years before bankruptcy. The working capital from operations and operating earning of the both of these firms were positive over a ten-year period before bankruptcy but the cash flow from operations was negative.

The above examples indicate that cash flow information can provide useful information about the liquidity and solvency of the firm which can not be obtained from accrual accounting. Observing cash flow information can aid the prediction of financial failure and evaluate the firm's ability to pay dividends and meet its obligations. Accrual accounting says little about the liquidity of the firm

and long-term solvency. This problem can be alleviated by the use of cash flow information.

"However, reliance on cash flow statement is insufficient for a complete assessment of the underlying strength of the company. Trends in sales and earnings must be evaluated from income statement data to determine whether there is a strong growth pattern that indicates a sustainable ability to generate cash flow in the future" (White et al., 2001, chapter 3).

2.3.2.2 Evaluate the quality of income

Accrual accounting is governed by the matching principle. This principle states that performance can be measured only if revenues and related costs are accounted for during the same period (White et al., 2001, chapter1). The matching principle recognises revenues when the firm provides goods and services to customers even if the collection of the cash will be later and it recognises expenses when the firm uses the goods or services provided by suppliers irrespective of the date of the payments for these goods.

In Statement of Financial Accounting Concepts (SFAC) No.1: Objectives of Financial Reporting by Business Enterprises, the Financial Accounting Standards Board (FASB) maintains the superiority of accrual earnings over cash flow. The FASB view that cash flow information is useful for the user of financial statements, but cash flow information can only provide an incomplete basis for assessing future cash flow. The FASB states that:

"Financial statements that show only cash receipts and payments during a short period, such as a year, can not adequately indicate whether or not an enterprise's performance is successful" (Para. 43).

"Information about enterprise earnings and its components measured by accrual accounting generally provides a better indication of enterprise performance than information about current cash receipts and payments"(Para. 44).

Accrual-based accounting earnings have been criticised because of its historical emphasis, and the flexibility inherent in generally accepted accounting principles (GAAP) provide managers with the opportunity to use accruals to manipulate income to suit their own purposes (Cheng at al., 1997). Self-interested managers

might use accounting discretion opportunistically and manipulate accruals, which would distort earnings as a measure of the firm's performance (Kothari, 2001). Accrual accounting also suffers from allocation problems where the measurement of net income involves judgments about accruals, allocation and valuations.

It has been argued that because of the multiple methods, through the various GAAP, used to compute accruals component of accounting earnings, it is difficult to compare accounting earnings across different firms and managers. Managers can choose among accounting methods which benefit their own interests.

Here, the concept of earnings quality arose from the need to compare the earnings of different firms and the need to recognise such difference in quality for valuation purposes (Mielke & Giacomino, 1988). Mielke & Giacomino (1988) interpreted earnings quality as follows.

1. It relates to a company's conservatism in calculating earnings.
2. It relates to the variability or stability of the firm's earnings.
3. It relates the relationship between the company accrual and its cash flow.
4. It relates the degree to which the firm's operations generate cash flow for the maintenance of assets and the enhancement of future earnings.

From 3 above, it appears that cash flow information can play an important role in judging the quality of income. Cash flow from operations is the cash basis counterpart to accrual net income (Wild et al., 2003, chapter 7). The measurements of cash flow from operations are unaffected by accounting accrual and deferrals. Cash flow from operations is thus seen as a more reliable firm performance measure (Cheng et al., 1997). This useful role of cash flow information has been asserted by both the Financial Accounting Standard Board (FASB) and Accounting Standard Board (ASB).

In Statement of Financial Accounting Concepts (SFAC) No.5: Recognition and Measurement in Financial Statement of Business Enterprises, the Financial Accounting Standards Board (FASB) shows the superiority of cash flow

information in comparison with earnings regarding the accuracy and the allocation problem. The FASB states that:

“Statement of cash flows present few recognition problems because all cash receipts and payments are recognized when they occur. Reporting cash flows involves no estimates or allocations and few judgments except regarding classification in cash flow statements” (Para. 54).

In Financial Reporting Standard (FRS) No.1 (revised 1996): Cash Flow statements, The Accounting Standard Board (ASB) stated that³³: "Historical cash flow information gives an indication of the relationship between profitability and cash generating ability, and thus of the quality of the profit earned" (Appendix III, Para. 2).

The major advantage of measuring and using cash flow information is less distortion or manipulation by management than in accrual information. There are some ratios which evaluate the quality of income and explain the reasons for differences between net income and associated cash receipts and payments. The reasons for these differences provide a basis for evaluating the quality of income³⁴ (Carslaw & Mills, 1991).

In summary, the current state of cash flow accounting is to disclose cash flow information via cash flow statement where cash flow accounting and accrual accounting should be regarded as complementary to each other rather than as alternative (Ashton, 1976). Cash flow information focuses on liquidity, whereas, accrual accounting focuses on profitability. For example, there is no conflict between cash flow from operations and net income where each one of them is designed to meet precise needs of the users of financial statements. The net income in accrual accounting depends on recognising the revenues earned and the expenses incurred. Cash flow from operations reports revenues received and expenses incurred. The point here is that we should assess the health and predict the death of the firm depending upon both net income and cash flow from operation where each one performs a specific role in evaluating the performance of the firm (Lee, 1992).

³³ Source: Green (1999).

³⁴ See, the quality ratios later in this chapter.

2.4 Prior studies on the relation between accrual measures and cash flow measures

This section shows several studies on the relationship between accrual measures and cash flow measures, which indicated that cash flow measures convey additional information over accrual measures for the users of financial statements³⁵.

(1) Belkaoui (1983)

Belkaoui (1983) evaluated the relative merits of accrual indicators and cash flow indicators. He defined three indicators: cash flows per share, earnings per share, and common equity³⁶ per share. Each one of these three indicators was divided by the price of the security adjusted for capital changes such as stock splits and stock dividends. The sample size was 66 U.S. firms from Fortune magazine's list of the 500 largest American firms for 19 years covering the period from 1959 to 1977. The evaluation was performed according to two characteristics: (i) the variability, the standard of variability was the coefficient of variation, and (ii) the persistency, the standard of persistency was the median rank correlation between the indicator this year and the previous year. The indicators which have the least variability and the highest persistence were considered the most consistent with the information that results in an efficient determination of security prices. The results showed that common equity per share has a lower variability and a higher persistency than the cash flow per share and earning per share. This phenomenon was attributed to both an income smoothing distortion hypothesis and a selective market response hypothesis. The implication of these results is that the financial position of a firm is deemed more indicative of a firm's potential by the market than either cash flow or income statement numbers.

(2) Gombola & Ketz (1983)

Usually the users of financial ratios try to reduce the huge number of these ratios to a manageable number consisting of small groups where each group contains

³⁵ To evaluate the usefulness of cash flow information from the perspective of capital market, see chapter 4: Prior studies on incremental information content of cash flow and earnings.

³⁶ In this study, common equity was defined as earnings, capital surplus, self-insurance reserve and capital stock premium.

some ratios which describe a special characteristic of the firm. Gombola & Ketz (1983) assessed the impact of cash-flow measurement upon classification patterns of financial ratios. The difference between this study and previous studies is the identification of cash-flow measures as representing a separate dimension of a firm's performance where the previous studies determined cash flow measure as the net income plus depreciation and most of these studies, which used the traditional measure of cash flow, could not classify cash flow ratios in a unique group. Gombola & Ketz measured cash flow as the difference between cash receipts and cash payment or the net income adjusted with all accrual and all deferrals.

The sample size of this study was 119 U.S. firm from 1962-1980. The study utilised the methodology of previous studies, performing the classification system of financial ratios by using factor analysis to examine interrelationships among 40 financial ratios. The study found eight financial ratio groups: (1) return on investment, (2) capital intensiveness, (3) inventory intensiveness, (4) financial leverage, (5) receivables intensiveness, (6) short-term liquidity, (7) cash position and (8) cash-flows ratios. The results were similar to the previous studies except that previous studies found seven financial groups and this study found the same seven financial groups in addition to a group of cash flow measures. These results confirmed a distinct difference between profitability measures and cash flow measures, and validate the separate disclosure of cash flow information.

(3) Thode et al. (1986)

Thode et al. (1986) investigated the relation between three measures (i) cash flow from operations, (ii) working capital from operations, and (iii) income from continuing operations. To assess whether cash flow information carries different signals to the users of financial statements which are different from accrual information. Thus, whether there is a need for a separate disclosure regarding cash flow information. The sample size³⁷ was all companies contained in Standard and Poor's 400 Industrials index during the ten- year period from 1973 to 1982. The data were derived from the Compustat Annual Industrial File.

³⁷ The sample size of this study varied for each hypothesis from 375 to 400 firms.

The study used two main methods. First, tests were carried out to see whether there were significant differences between the three measures. This test was performed via a T-test for the difference between two samples and this test was applied with two kinds of measurements: (i) the current level of the variables, and (ii) the first difference of these variables. The second sets of tests examined whether there is a relation between the three measures. This test was performed by using the regression technique with the same two kinds of measurements of the variables employed in the first test. The results showed that there is a need for disclosure of cash flow information where there was a significant difference between cash flows from operations and the other two measures according to T-test statistics and there was no significant relationship between cash flows from operations and the other two measures according to the regression model.

(4) Bowen et al. (1986)

The objective of this study was to provide answers to the following three questions: (i) are traditional cash flow measures used in previous research highly correlated with alternative measures of cash flow that were recently advocated by academics and practitioners? (ii) are accrual accounting earnings and cash flow measures highly correlated? and (iii) does earnings or a cash flow variable best predict future cash flow?

The first two questions³⁸ were investigated by examining the coefficients of correlation between the first differences and the percentage first differences of the following six measures³⁹ for each firm over 10 years : (1) net income before extraordinary items and discontinued operations, (2) net income before extraordinary items and discontinued operations plus depreciation and amortization, (3) working capital from operations, (4) cash flows from operations, (5) cash flow after investment, and (6) changes in cash flow. Measures 2 & 3 were considered as traditional cash flow measures, whereas measures 4 & 5 & 6 were considered alternative cash flow measures that incorporate more extensive adjustments. Mean R^2 (mean squared correlation

³⁸ The sample size of this study was 324 U.S. firms over the period from 1971-1981.

³⁹ For more details regarding the definitions of these measures see Bowen et al. (1986) in chapter 4.

coefficients) of all sample firms was employed to examine the relationships between each pair of variables. The results showed that traditional measures of cash flow (i.e., net income plus depreciation and amortization, and working capital from operations) are highly correlated with earnings, whereas the correlations of alternative measures of cash flow with earnings are low. So there is a need to use cash flow information from the perspective of the new definition.

The third question was investigated by examining which measures from these previous measures are good variables for prediction of one and two-period future cash flow. Using the random-walk model and lagged values of the predictor variable, the study confirmed that the random-walk model is a good predictor of cash flow measures and also working capital from operations and net income before extraordinary items and discontinued operations plus depreciation and amortization were also good variables for the prediction of cash flow from operations⁴⁰. These results are not consistent with the FASB's statements that earnings numbers provide better forecasts of future cash flows than do cash flow numbers.

(5) Charitou & Venieris (1990)

Charitou & Venieris (1990) investigated the relationships between three measures: (i) operating net income, (ii) working capital from operations, and (iii) cash flows from operations in order to answer the question as to whether the traditional measures consider a proxy for cash flows from operation.

The sample consisted of 60 Greek firms with financial statement data available for the three-year period 1981-1983. Moreover, the relationship between operating net income, working capital from operation and cash flows from operations was examined for two bankrupt Greek firms, Barko and Avrassoglou, for the ten-year period preceding their bankruptcy. The study measured the relationship between the three measures by using a correlation technique.

⁴⁰ For more details about the results of this study related to prediction of future cash flow see chapter 3, section 3.3.3.

The results showed that the relationship between cash flows from operations and working capital from operations or operating net income was very weak and the relationship between working capital from operations and operating net income was strong. From these results there is increasing evidence of a need to disclose cash flow information. Also, the results showed that careful analysis of several bankrupt Greek firm's cash flow, among those Barko and Avrassoglou, could have indicated liquidity and solvency problems several years before bankruptcy.

(6) Arnold et al. (1991)

Based on sample size of 171 U.K. firms over the period from 1965 to 1984, Arnold et al. (1991) carried out a similar study to Bowen et al. (1986). Specifically, they examined the contemporaneous and predictive relationships between measures of earnings, funds flows and cash flow. They examined seven variables which represent a sequence of successive adjustments from earnings to entity cash flow. These variables were (1) net income, (2) working capital from operations, (3) net quick flow (working capital from operations +/- stock change), (4) cash flow from operations, (5) cash flow after investments, (6) cash change, and (7) entity cash flow (cash flow after investments – cash change).

Based on a research methodology applied by Bowen et al. (1986), the results showed that earnings and working capital flows were significantly correlated, whereas the associations between earnings and the remaining funds and cash flow variables were not significant. This means that earnings differ statistically from cash flow signals but less so from the working capital flow signal. The association between funds flow and cash flow variables were not statistically significant. However, there were a small percentage of significant correlations between entity cash flow and all other 6 variables. This suggests that earnings, operating funds, and cash flow variables do not effectively capture, at least individually, the signal provided by entity cash flow.

In respect to predictive relationships, the findings showed that working capital from operations was the best predictor of cash flow from operations and net quick flow. The random walk-model appeared to provide the best predictor of the other cash flow variables. Again these results are consistent with Bowen et

al. (1986) where accounting earnings did not have superior predictive ability in relation to any cash flow variable⁴¹.

(7) Shroff (1998)

Shroff (1998) compared and contrasted the properties of three firm-performance measures: (i) accrual income⁴², (ii) operating cash flow⁴³, and (iii) market return⁴⁴, economic income. The purpose was to understand the differences between these three measures, especially, with respect to the characteristics of smoothness and aggregation over time. The study analysed the time-series of the previous three measures over 55 years from 1937 to 1991 for Kmart Corporation. This corporation, known as S.S. Kresge Company until 1978, is one of the world's largest general multi-divisional specialty retailers.

The results showed the following.

- The variance, the standard deviation, of changes in accrual income is lower than variance of change in operating cash flow. This result supports the smoothing property of accrual accounting. The smoothing property encompasses the characteristics of relevance, predictive ability, and representational faithfulness identified by the statement of financial accounting concepts No.2, Qualitative Characteristics of Accounting Information (FASB 1980). Thus, the accrual income is a better measure of economic income.
- The correlation between accrual income and return was higher than the correlation between operating cash flow and return.

⁴¹ For more details about the results of this study related to prediction of cash flow see chapter 3, section 3.3.3.

⁴² In this study, accrual income was measured by income before extraordinary items and discontinued operations.

⁴³ In this study, operating cash flow, CFO, was measured by income before extraordinary items and discontinued operations adjusted for extraordinary items, discontinued operations, depreciation, deferred taxes, gains and losses from sale of investments and fixed assets, changes in non-cash current assets and changes in current liabilities other than current maturities of long-term debt.

⁴⁴ In this study, return equals the annual change in market value plus dividends (where market value equals closing price multiplied by number of common share outstanding).

- The study used a random-walk model⁴⁵ or random walk plus drift model⁴⁶ for prediction of the amount of accrual income, operating cash flow and return, the prediction errors were the lowest for accrual income. Again, this supports the smoothing property of accrual income. Also, by using accrual income to predict the operating cash flow and return, the prediction error was lower than the prediction error obtained when using operating cash flow or return to predict themselves. This suggested accrual income is a better predictor of future performance than cash flow.

The main conclusion of the above seven studies on the relation between accrual measures and cash flow measures is that, in the majority of cases, cash flow measures provide additional useful information for the users of financial statements. However, these studies examined the benefits of cash flow information relative to accrual information by using t test for the difference between two samples or correlation technique. Both these univariate techniques can be considered as naïve methods to assess whether cash flow information provides useful information beyond that contained in accrual information about a firm's current as well as future performance⁴⁷.

2.5 Cash flow-based measures⁴⁸ used for evaluating a firm's financial performance

This section presents the financial measures which can be computed depending upon cash flow information to evaluate different aspects of firm's financial performance, such as firm's liquidity, solvency, and profitability.

In Statement of Financial Accounting Concepts (SFAC) No.1: Objectives of Financial Reporting by Business Enterprises, the Financial Accounting Standards Board (FASB) determines many objectives of financial reporting. One of these

⁴⁵ The definition of the random walk model is that changes in a variable are unpredictable. Hence, the best estimate of next year's number is the current year's realisation.

⁴⁶ The random walk plus drift model assumes that the best estimate of the next year's number is the current year's realisation plus a drift term. The drift term is usually measured by the average change in the variable over the previous five years or so.

⁴⁷ For more details about the usefulness of cash flow information from the perspective of capital market see chapter 4.

⁴⁸ In this section the terms 'measures' and 'ratios' have been used interchangeably.

objectives is providing information about enterprise performance. The FASB states that:

“Financial reporting should provide information about enterprise’s financial performance during a period. Investors and creditor’s often use information about the past to help in assessing the prospects of an enterprise” (Para. 42).

“The primary focus of financial reporting is information about an enterprise’s performance provided by measures of earnings and its components” (Para. 43).

Financial measures (ratios) are the most widely used technique for evaluating financial performance of the firm from year to year or between different firms. This is because these financial measures summarise briefly all the events that happened during the financial period.

Years before the accounting standard setting body required the reporting of cash flow, financial analysts and creditors were computing financial measures depending upon the income statement, balance sheet and funds statement or the statement of changes in financial position. According to the statement of changes in financial position, the working capital provided by operations was used as a surrogate for the cash flow of the firm. These financial measures derived from the income statement and balance sheet are usually called accrual-based measures.

Several studies⁴⁹ showed that depending only upon accruals-based measures and a poor measure of a company’s ability to generate cash like working capital from operation is not enough to judge and evaluate the performance of the firm. Academic research in accounting started decades before the accounting standard setting body required the reporting of the statement of cash flow to recommend the users of financial statements to use cash flow-based measures computed on the basis of cash flow information in addition to accrual-based measures.

Using cash flow-based measures in addition to the traditional accrual-based measures in evaluating a firm's financial performance rests on the premise that

⁴⁹ For more details about these studies see section 2.3.2. in this chapter.

these measures provide additional useful information for the users of financial statements.

The accounting literature review regarding cash flow-based measures indicates that there was not a comprehensive set of cash flow-based measures to evaluate the different aspects of a firm's financial performance in comparison with accrual-based measures. The following quotations can support the previous opinions regarding the lack of cash flow-based measures.

“The new statement of cash flow will provide information useful in evaluating the performance of a firm. Although ratio analysis is a common technique for analyzing the balance sheet and the income statement, it has not been used much to analyze cash flows” (Mielke & Giacomino, 1988 , P.10).

“While there has been considerable support for the statement of cash flow since its proposal in 1986, little has been written or developed on the effective use or analysis of it” (Carslaw & Mills, 1991, P.63).

“Analysts have developed many financial ratios that are widely used by practitioners and academicians. ... Little has been done to suggest a comprehensive set of cash flows ratios with the potential to evaluate financial performance” (Giacomino & Mielke, 1993, P.55).

The academic accounting community started to provide the different users of financial statements with cash flow-based measures (over accrual-based measures) which evaluate different aspects of the financial performance of the firm. For example, Mielke & Giacomino (1988) in their article “ratio analysis using the new statement of cash flows” mentioned four groups of ratios which can be derived from cash flows statement (i) quality of earnings, (ii) financial management, (iii) mandatory cash flows, and (iv) discretionary cash flow. Carslaw & Mills (1991) provided us with four categories of cash flows ratios which assess (i) solvency and liquidity, (ii) quality of income, (iii) capital expenditures, and (iv) cash flow returns. Giacomino & Mielke (1993) classified cash flows ratios into two main groups (i) sufficiency ratios, and (ii) efficiency ratios.

It is customary for textbooks on the analysis of financial statement to divide the measures of financial performance to specific categories or groups. It is familiar now that these categories or groups contain cash flow-based-measures beside

accrual-based measures. Glautier & Underdown (1997, Chapter 16) classified the financial measures into (i) short-term and long-term solvency ratios, (ii) profitability and activity ratios, and (iii) cash flow ratios. Wild et al. (2003, chapter 1) grouped the financial measures into: (i) short-term liquidity ratios, (ii) capital structure and long term solvency ratios, (iii) return on investment ratios, (iv) operating performance ratios, and (v) asset utilisation and market ratios. White et al. (2001, Chapter 4) divided the financial measures into four broad categories (i) activity ratios, (ii) liquidity ratios, (iii) long-term debt and solvency ratios, and (iv) profitability ratios.

The reason of the classification for the financial measures is that there are many users of financial statements such as bankers, trade creditors, long-term creditors and equity investors, each interested in evaluating a specific area of a firm's performance. Short-term bank and trade creditors are primarily interested in the immediate liquidity of the firm so they use the financial measures to determine whether the firm is likely to meet its current obligations. Long-term creditors are interested in long-term solvency so they use financial measures to determine whether the firm has the ability to pay both the principal and interest on the loans it receives. Equity investors are interested in the long-term earning power of the firm so they use financial measures to determine the current profitability of the firm and attempt to predict its future profitability. Furthermore, the activity measures which evaluate the relation between revenues and the assets of the firm.

Cash flow information which can be captured from the cash flow statements provides information about cash receipts and cash payments by the functional areas of operating, investing, and financing activities. One purpose of cash flow statement is to (i) evaluate a firm's ability to generate future positive cash, (ii) evaluate a firm's ability to meet its obligations regarding dividends, principal and interest, (iii) evaluate the quality of income, (iv) evaluate a firm's ability to meet its capital expenditure, and (v) evaluate a firm's ability to finance its investments from external and internal finance sources. To achieve the above purpose there should be a comprehensive set of cash flow-based measures.

The cash flow based measures computed from the statement of changes in financial position lacked comparability over time and across firms for two main reasons (Zeller & Stanko, 1994) (i) the primary categories of cash flow activity into operating, investment, and financing had not been specified under this statement, and (ii) the term cash had not been defined.

The main advantage of using cash flow measures derived from cash flow statements is that cash flow information removes the distortion caused by comparing the earnings of firms that use different allocation and depreciation methods (Mielke & Giacomino, 1988). Cash flow information used to calculate cash flow-based measures is more reliable than balance sheet or income statement (Mills & Yamamura, 1998). Balance sheet data are static, measuring a single moment, whereas income statement contains many arbitrary non-cash allocations. For example, "traditional working capital ratios indicate how much cash the company had available on a single date in the past. Cash flow ratios, on the other hand, test how much cash was generated over a period of time and compare that to near-term obligations, giving a dynamic picture of what resources the company can muster to meet its commitments" (Mills & Yamamura, 1998, P. 55).

In the following section, cash flow-based measures⁵⁰ which evaluate different aspects of firm's financial performance are divided into five groups as follows (i) liquidity measures (measure firm's ability to meet short-term obligations), (ii) solvency measures (measure firm's ability to meet long-term obligations), (iii) profitability measures (measure firm's return on investments), (iv) other cash flow based-measures (cash flow-based measures which analyse the finance and investment activities), and (v) quality ratios. Given the vast number of these

⁵⁰ The main references used to determine cash flow-based measures presented in this section are:

- Mielke, D. E. & D. E. Giacomino, (1988). "Ratio analysis using the new statement of cash flows", Corporate Accounting, 6 (1): Winter, PP. 10-16.
- Carslaw, C. A. & J. R. Mills, (1991). "Developing ratios for Effective cash flow statement analysis, Journal of Accountancy, 172 (5): November, pp. 63-70.
- Giacomino, D. E. & D. E. Mielke, (1993) "Cash flows: Another approach to ratio analysis", Journal of Accountancy, 175 (3): March, pp. 55- 58.
- White, G. I., A. C. Sondhi, et al. (2001). *The Analysis and Use of Financial Statements*. 3rd ed. New York, John Wiley & Sons, INC.

measures, the following section presents only the key cash flow based-measures included in each group.

2.5.1 Cash flow-based liquidity measures

It is known that the most common accrual-based measures which evaluate a firm's liquidity are (i) current ratio, (ii) quick ratio, and (iii) cash ratio. Whereas, the most common cash flow-based measures which evaluate firm's liquidity are as follows.

1. Cash flow from operations to current liabilities ratio

$$\text{Cash flow from operations} / \text{average current liabilities}$$

This ratio measures liquidity by comparing actual cash flow (instead of current and potential cash resources) with current liabilities. This ratio avoids the issues of actual convertibility to cash, turnover, and the need for minimum levels of working capital (cash) to maintain operations (White et al., 2001, chapter 4).

This ratio indicates the approximate excess, or shortfall, of cash generated from operations that is available to meet current liabilities and obligations (Zeller & Stanko, 1994). It measures a firm's ability to generate resources to meet current liabilities (Mills & Yamamura, 1998), the higher the ratio, the greater the firm's liquidity.

2. Cash dividends payout coverage ratio

$$\text{Cash flow from operations} / \text{total paid dividends}$$

Or

$$(\text{Cash flow from operations} - \text{preferred dividends}) / \text{Common stock dividends}$$

The cash dividends coverage ratio provides evidence of the ability of the firm to meet its current dividends from normal operating cash flow. This ratio can

evaluate a company's ability to pay all dividends or its ability to pay dividends to common stockholders (Carslaw & Mills, 1991).

2.5.2 Cash flow-based solvency measures

It is known that the most common accrual-based measures which evaluate a firm's solvency are (i) debt to total capital ratio, (ii) debt to equity ratio, and (iii) times interest earned. The most common cash flow-based measures which evaluate firm's solvency are as follows.

1. Cash flow from operations to debt ratio (cash debt coverage ratio)

$$\text{Cash flow from operations} / \text{average total debt}$$

This ratio measures the coverage of principal repayment requirements by the current cash flow from operations (CFO). Low CFO-to-debt ratio could signal a long-term solvency problem as the firm does not generate enough cash internally to repay its debt (White et al., 2001, Chapter 4). This ratio indicates the length of time it will take to repay the debt, assuming all cash flow from operations is devoted to debt repayment. It measures a firm's ability to cover future debt obligations (Mills & Yamamura, 1998). The higher this ratio, the greater a firm's ability to cover its total debt from cash, the lower the ratio, the less financial flexibility the firm has, and the more likely that problems will arise in the future (Schmidgall et al., 1993; Mills & Yamamura, 1998).

2. Cash interest coverage

$$\frac{\text{Cash flow from operations plus (before) interest and tax paid}}{\text{Interest paid}}$$

This ratio indicates the firm's ability to generate cash flow from operations in relations to its interest-payment obligation. The purpose of this ratio is to show the number of times interest paid could be paid out of cash flow from operations. The higher the ratio the better to cover its debt service (Schmidgall et al., 1993). Traditional times interest earned ratio may not accurately reflect coverage of

interest because of the non-cash adjustments required to calculate accrual income (Zeller & Stanko, 1994).

2.5.3 Cash flow-based profitability measures

The cash flow-based profitability measures are counterpart of similar accrual-based profitability measures, but they should be used with caution. This is because cash flow-based profitability measures do not contain provisions for replacement of assets or for future commitments whereas accrual-based profitability measures contain provisions for depreciation and charges for such items as future pension liabilities (Carslaw & Mills, 1991; White et al., 2001, Chapter 4). It will be useful, if these cash flow-based profitability measures are compared with other firms in the same industry to provide guidance on the firm's ability to generate superior future cash flow from invested funds (Carslaw & Mills, 1991).

It is known that the most common accrual-based measures which evaluate firm's profitability are (i) return on assets (ROA), (ii) return on common equity (ROE), whereas, the most common cash flow-based measures which evaluate a firm's profitability are as follows.

1. Cash return on assets

$$\frac{\text{Cash flows from operations plus (before) interest and tax}}{\text{Average total assets}}$$

This ratio indicates the cash-generating ability of the assets; where strong cash return helps generate future investments (Carslaw & Mills, 1991).

2. Cash flow return on common equity ratio

$$\frac{\text{Cash flow from operations}}{\text{Average common equity}}$$

This ratio indicates the ability of the firm to generate returns to the investors (Carslaw & Mills, 1991).

2.5.4 Other cash flow-based measures

These other cash flow-based measures (cash flow-based measures which analyse the finance and investment activities) computed from the cash flow statements do not correspond directly to the measures reported elsewhere in the financial statements. Therefore these new measures could be significant for evaluating a firm's financial performance.

1. Capital acquisitions ratio (reinvestment ratio)

$$\frac{(\text{Cash flows from operations} - \text{total dividends})}{\text{Cash paid for acquisitions}}$$

The capital acquisitions ratio shows a firm's ability to meet its capital expenditure requirements. In this ratio, retained cash flow after dividends is used as the measure of cash available for capital expenditures (Carslaw & Mills, 1991). Cash paid for acquisitions represents cash outflow for investments. This ratio reflects the percentage of cash outflow for investments covered by cash flow from operations after dividends; the higher the ratio, the less reliance is placed on external funding for investments (Schmidgall et al., 1993). This ratio should be compared with the following ratio.

- Depreciation – amortization impact ratio

$$\frac{(\text{Depreciation} + \text{amortization})}{\text{Cash flow from operations}}$$

This ratio shows the percentage of cash from operations resulting from add-back of depreciation and amortization. It will be useful to compare this ratio with the capital acquisition ratio to provide insight into the sufficiency of a firm's reinvestment and maintenance of its assets. The firm will be more efficient if this ratio has a relatively low importance relation to cash flow from operations (Giacomino & Mielke, 1993). Over several years, the capital acquisition ratio

should exceed the depreciation – amortization impact ratio to ensure sufficient replacement of assets at higher current cost (Giacomino & Mielke, 1993).

2. Investment / finance ratio:

$$\frac{\text{Net cash flow for investing}}{\text{net cash flow from financing}}$$

This ratio compares the total funds needed for investing purposes with funds generated from financing. In other words, this ratio measures the firm's ability to finance its investments from external finance sources. Normally ratios such as these tend to fluctuate, so it will be useful and meaningful if we average the figures over several years (Carslaw & Mills, 1991). Also, instead of comparing cash flow for investing with only cash flow from finance, cash flow for investing can be compared with cash flow from both financing and operating activities.

2.5.5 The quality ratios

1. Quality of sales

$$\frac{\text{Cash from operations}}{\text{sales}}$$

This ratio shows the percentage of cash flow from operations per dollar of sales, the higher the cash flowing from each dollar taken in, the better, since the ratio measures the firm's ability to translate sales into cash (Schmidgall et al., 1993).

2. Quality of income

$$\frac{\text{Cash flows from operations}}{\text{operating income}}$$

This ratio evaluates the quality of income by providing an indication of the variance between cash flow and reported earnings; it indicates the percentage of

cash flow from operations represented in operating income⁵¹. If this ratio continues over several periods to be consistently and significantly less than 1, this means that operating income may be overstating the firm's true performance (Zeller & Stanko, 1994). So, any major variances from a one-to-one ratio should automatically result in investigation of the abnormality (Carslaw & Mills, 1991). A direct method of reporting cash flow is required to compute ratios such as quality of income.

2.6 Summary

This chapter has addressed some issues relating to cash flow accounting and its role in evaluating a firm's financial performance. First, the chapter reviewed the historical development of cash flow statements by presenting the official pronouncements related to funds statement and cash flow statements issued in the U.S., and U.K., and on the level of the international accounting standard committee. This review showed the movement from the working capital concept to the cash concept which requires firms to prepare a cash flow statement as a part of the full set of financial statements.

Second, the debate between cash flow accounting and accrual accounting showed that the two accounting systems are complementary and not competing, where each one has been designed to meet a specific needs for the user of the financial statement. Accrual accounting assesses a firm's profitability and cash flow accounting assesses a firm's liquidity. In addition, the two main reasons for demands for cash flow accounting have been presented in this chapter. These two reasons were to evaluate a firm's liquidity and solvency, and evaluate the quality of income.

Third, some studies on the relation between accrual measures and cash flow measures have been presented. The main conclusion of these studies is that cash flow information conveys different signals from accrual information for the users of financial statements.

⁵¹ Operating income = net income – income from affiliates or asset sales (the effects of investments transaction) – interest expense (the effects of financing transaction) – tax expense.

Fourth, this chapter also presented detailed cash flow-based measures which evaluate different aspects of firm's financial performance such as liquidity, solvency, and profitability of the firm. In addition to other cash flow ratios which analyse the finance and investment activities and quality ratios which evaluate the quality of income and the quality of sales. Using cash flow-based measures in conjunction with traditional balance sheet and income statement measures will lead to a better understanding of the financial strength and weaknesses of the firm.

In addition to using cash flow information in evaluating a firm's financial performance which has been presented in this chapter, the other uses of cash flow information will be presented in the next chapter. Three main areas of the usefulness of cash flow information will be presented (i) cash flow information and bankruptcy studies, (ii) cash flow information and prediction of cash flow studies, and (iii) cash flow information and capital market studies.

Chapter 3: Studies into the usefulness of cash flow information

3.1 Introduction

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3.5 Summary

Chapter 3: Studies into the usefulness of cash flow information

3.1 Introduction

In addition to the role of cash flow information in providing measures for evaluating a firm's financial performance, which was reviewed in chapter 2, there are many other uses for cash flow data. Neil et al. (1991) reviewed the usefulness of cash flow information up to the 1991. Their review included studies that emphasise the decision-making relevance of cash flow data in predicting events of interest to the users of the financial statement. They argued that:

"The importance of assessing the predictive ability of cash flows across decision contexts represents a unifying theme for the three cash flow research areas... First, studies that examine capital market effects have relevance for security investment decisions... These studies relate the current cash flows of going concerns to the market's implicit valuation of future cash flows as reflected in changes in security prices. Second, research has addressed the ability of cash flows to predict themselves. This line of inquiry implicitly assumes that cash flows are relevant to a wide range of decision makers. A third research area examines the ability of cash flow data to predict financial distress..... these studies attempt to provide assessments of the usefulness of cash flow data in both lending and investing decisions" (Neill et al., 1991, PP. 118:119).

It can be stated from the above quotation that the usefulness of cash flow information in decision-making relevance falls into three main areas: (i) capital market studies, (ii) bankruptcy and financial failure studies, and (iii) prediction of future cash flow studies. The main objective of this study is to investigate the incremental information content of earnings, working capital from operations, and cash flow from operations which constitutes a part of the market-based accounting research (MBAR). The aim of this chapter is therefore to show the foundations of cash flow information and capital market studies as a preliminary step to the next chapter, chapter 4, which is assigned completely to the prior studies on the incremental information content of cash flow and earnings as an area of the usefulness of cash flow information. This chapter also provides a brief review and discussion for the role of cash flow information in other two areas: bankruptcy and financial failure studies, and prediction of future cash flow⁵².

⁵² Discussion of bankruptcy studies and prediction of cash flow studies is limited to the studies which showed the role of cash flow in these two areas.

This chapter is organised as follows: Section 2 and 3 provide a brief review and discussion of the usefulness of cash flow information concerned with bankruptcy and financial failure studies and prediction of future cash flow studies respectively. Section 4 shows the foundations of cash flow information and capital market studies. Section 5 concludes the chapter.

3.2 Cash flow information and bankruptcy studies

3.2.1 Objective of bankruptcy studies

The objective of bankruptcy studies is to develop a model that can predict the bankruptcy of the firm one or more years before failure. When a firm files for bankruptcy, creditors usually lose a portion of principal and interest payments due, and investors may suffer substantial dilution or loss of their equity interest. In addition, legal costs are caused because of the event of bankruptcy even if the firm survives (White et al., 2001, Chapter 18). A failure of the firm has negative consequences for many other parties such as employees, customers, taxation authorities and the community in general. The importance of bankruptcy models is to avoid the loss to creditors and investors by predicting the bankruptcy a few years ahead.

Bankruptcy models help to explain why firms fail or which firms are more likely to fail than others in the future. The premise of bankruptcy studies rely on the fact that it is possible to use financial ratios to predict financial failure. Models of bankruptcy studies usually use financial ratios computed from financial statements and other data (Stickney et al., 2004, Chapter 5).

3.2.2 Models of bankruptcy studies

There are two types of bankruptcy studies: the first uses univariate models, and the second uses multivariate models. Univariate models examine the ability of a particular financial ratio to predict bankruptcy without consideration of the other ratios. Univariate models have been criticised because they do not provide a means of measuring the relative importance of individual financial ratios or of combining them when assessing the possibility of bankruptcy. This deficiency of univariate models led researchers during the late 1960s and throughout the 1970s

to use the multivariate models which combine several financial statement ratios to determine which set of ratios can predict the bankruptcy of the firm (Stickney et al., 2004, Chapter 5). Currently, most work in this area is multivariate.

In bankruptcy studies, the evaluation of the predictive model can be captured by the predictive accuracy of the model, considering two types of misclassification errors: type I error and type II error (White et al., 2001, Chapter 18). Type I error refers to the misclassification of a firm by predicting non-bankruptcy when in reality the firm will become bankrupt. Type II error refers to the misclassification of a solvent firm as bankrupt. Type I error is more costly than type II error. Type I error causes the loss of the principal amount invested, and type II error causes the opportunity cost of the amount invested. Usually, classification accuracy is used for comparing the same models which contain different ratios to determine whether, for example, adding specific cash flow ratios increase the predictive accuracy of the model in comparison with the classification accuracy of the model which use only some specific accrual ratios. Classification accuracy is obtained by comparing the predicted outcome to the actual classification. Another criterion for determining the variables which distinguish best between failed versus non-failed firms is to examine the statistical significance of the slope coefficient for the variables included in the model.

In the literature on bankruptcy studies, there are three main stages in the methodological development of the bankruptcy studies; namely, (i) Beaver's study (1966), (ii) Altman's study (1968), and (iii) Ohlson's study (1980)⁵³. The work of Beaver (1966) was univariate, and the works of Altman (1968) and Ohlson (1980) were multivariate.

Serious interest in developing models for prediction of bankruptcy arguably began with Beaver (1966). Beaver's work was univariate and can be considered the first stage of methodological development of the bankruptcy studies. He studied 29 financial ratios for the five years preceding bankruptcy for a sample of bankrupt and non-bankrupt firms. The objective was to determine which ratios are the best in distinguishing between failed versus non-failed firms or in other

⁵³ For a discussion of other methodological issues in bankruptcy studies see Stickney et al. (2004), chapter 5.

words, which ratios have a significant difference between these two group of firms and for how many years before the bankruptcy. Beaver found that the best ratio for predicting bankruptcy was net income before depreciation, depletion, and amortization divided by total liabilities.

The other two stages in the methodological development of the bankruptcy studies can be classified as multivariate models. These two stages are closely associated with the work of Altman (1968) who first employed multiple discriminant analysis (MDA) and the work of Ohlson (1980) who first employed logit analysis.

Because of the deficiencies of univariate models, as indicated above, Altman in 1968 started his work in the prediction of bankruptcy by using MDA. MDA determines the best set of ratios (usually six or five) that best distinguish between bankrupt and non-bankrupt (Stickney et al., 2004, Chapter 5). The most famous MDA bankruptcy prediction model is Altman's Z-score (1968) which was developed for manufacturing firms. The Z-score is the value resulting from the following MDA model⁵⁴:

$$\text{Z-score} = .012 X1 + .014 X2 + .003 X3 + .006 X4 + .999 X5$$

Where

X1	net working capital / total assets
X2	retained earnings/ total assets
X3	earnings before interest and taxes / total assets
X4	market value of equity / book value of total debt
X5	sales / total assets
Z-score	overall index

When Altman's Z-score is applied to a firm's financial ratios by multiplying the model's coefficients by the particular financial ratios and then summed, a Z-score

⁵⁴ Altman (1968) examined 22 ratios and multiple discriminant analysis (MDA) reducing these ratios to five ratios which appeared in the model. These five ratios are the best in distinguishing between failed and non-failed firms examined in this study.

is obtained. This Z-score is then compared to a cut-off point that classifies a firm into either high or low probability of bankruptcy. In his analysis, Altman found that a Z-score of the firm is of less than 1.81 indicates a high probability of bankruptcy, whereas, a Z-score of more than 2.99 indicates a low probability of bankruptcy. Scores between 1.81 and 2.99 are in the gray (ambiguous) area. The explicit disadvantages of the MDA score is that this score requires the analysts to choose subjectively the range of scores indicating high, low, and uncertain likelihood of bankruptcy (Stickney et al., 2004, Chapter 5).

MDA has a number of requirements such as the condition of the normal distribution of the predictor variables and the equality of the variance-covariance matrices between the two groups of failed and non-failed firms. Ohlson (1980) therefore used logit analysis to build a model which can predict bankruptcy. Like MDA, Logit analysis determines the best group of ratios which can distinguish between the bankruptcy and non-bankruptcy firms. In contrast to MDA, the outcome of Logit analysis is a score which represents a probability of bankruptcy for each firm when applying this model.

The logit model determines the probability of bankruptcy from the following equation (Stickney et al., 2004, Chapter 5).

$$P = 1 / (1 + e^{-y})$$

Where:

- P is the probability of bankruptcy for a firm
- e equals approximately 2.718282 (the base e of the natural log)
- y A multivariate function that includes a constant and coefficients for a set of financial ratios

The study of Ohlson examined 105 bankrupt and 2058 non-bankrupt firms in 1985. He found that using a cut-off of 3.8 percent to discriminate between bankrupt and non-bankrupt firms minimised the overall errors; type I error and type II error. His model for one year prior to bankruptcy by using logit analysis is defined as follows.

$$y = -1.32 - .407 (\text{SIZE}) + 6.03 (\text{TLTA}) - 1.43 (\text{WCTA}) + .0757 (\text{CLCA}) - 2.37 (\text{NITA}) - 1.83 (\text{FUTL}) + .285 (\text{INTWO}) - 1.72 (\text{OENEG}) - .521 (\text{CHIN})$$

Size	Natural log of (Total assets / GNP price level index)
TLTA	Total liabilities / Total assets
WCTA	(Current assets – Current liabilities) / total assets
CLCA	Current liabilities / current assets
NITA	Net income / total assets
FUTL	Funds (working capital) from operation / Total liabilities
INTWO	One if net income was negative for the last two years and zero otherwise
OENEG	One if total liabilities exceed total assets and zero otherwise
CHIN	$(\text{Net income}_t - \text{Net income}_{t-1}) / (\text{Net income}_t + \text{Net income}_{t-1})$. This variable is a measure of the change in net income.

3.2.3 Cash flow bankruptcy studies⁵⁵

By looking at the independent variables in the models of bankruptcy and financial failure prediction, these models can be classified into three main groups: (i) accrual financial ratio-based models, (ii) cash flow based models, and (iii) models utilising both accrual financial ratios and cash flow measures. Before the financial accounting standard board issued the accounting standard on cash flow, SFAS 95, almost all bankruptcy prediction studies focused on the use of accrual financial ratios. Since then, both financial ratio and cash flow models have begun to be put forward (McGurr & DeVaney, 1998). Intuitively, negative cash flow ratios suggest higher risk and poorer ability to repay firm's obligations: hence, a higher probability of bankruptcy exists.

⁵⁵ For a review article on cash flow bankruptcy studies up to 1991 see Neill et al. (1991).

The questions which have been raised regarding the usefulness of cash flow information in predicting bankruptcy include the following.

1. Whether cash flow ratios when included in bankruptcy prediction models, in addition to accrual ratios, are useful in predicting failed versus non-failed firms.
2. Whether cash flow ratios when included in bankruptcy models, in addition to accrual ratios, improve the predictive accuracy of these models in comparison with the models which employed only accrual ratios.
3. Whether cash flow ratios alone can be used effectively in bankruptcy models to predict failed versus non-failed firms.

Some key studies on the usefulness of cash flow information for bankruptcy prediction are discussed next.

(1) Casey & Bartczak (1984)

Casey & Bartczak (1984) examined the ability of three cash flow variables to predict bankruptcy. These three variables were: (i) cash flow from operations, (ii) cash flow from operations divided by current liabilities, and (iii) cash flow from operations divided by total liabilities. Their sample size was 290 U.S. firms (60 bankrupt firms and 230 non-bankrupt firms) over the period from 1971 to 1982. They employed both univariate analysis and multiple discriminant analysis (MDA).

The results of the univariate analysis showed that the mean values, of each variable for bankrupt firms, were significantly lower than for the non-bankrupt firms. However, the predictive accuracy of each variable through the five year prediction interval did not exceed 75%. The best-performing variable was cash flow from operations divided by current liabilities which showed classification accuracy of 75%-62% one year to five years before failure, respectively. In the MDA, the predictive accuracy improved from 86% to 61% one year to five years

before failure, respectively, when using six conventional accrual ratios⁵⁶. To assess the marginal value of the three cash flow variables, they ran for each year, from the five years, separate discriminant analyses including the six accrual ratios and each of the three operating cash flow variables. The results showed that the classification accuracy obtained using the six accrual ratios alone have not been improved. They concluded that "operating cash flow measures were less accurate a predictor of failure than accrual-based measures"(P. 61).

(2) Casey & Bartczak (1985)

In a follow-up study, Casey & Bartczak (1985) focused on the marginal improvement in classification accuracy obtained from cash flow variables when used in combination with accrual-based ratios. They employed conditional stepwise logit analysis and MDA with the same data set and the same six accrual ratios and the three cash flow variables of their previous study in 1984. The results showed that the inclusion of the three cash flow measures to the six accrual ratios did not increase the classification accuracy; hence, there was no marginal improvement in classification accuracy. These finding were consistent with the previous study of Casey & Bartczak (1985).

(3) Gentry et al. (1985 A)

Gentry et al. (1985 A) examined the predictive ability of eight funds flow components to distinguish between failed versus non-failed firms. The objective was to determine whether funds flow components by themselves can discriminate between failed and non-failed firms. Their eight⁵⁷ funds components were: (1) funds flow from operations / total net flow, (2) working capital⁵⁸ / total net flow, (3) financing flow/ total net flow, (4) fixed coverage expenses (interest and lease payments) / total net flow, (5) capital expenditures / total net flow, (6) dividends / total net flow, (7) other asset and liability flow / total net flow and (8)

⁵⁶ These six accrual ratios were: (1) net income / total assets, (2) cash / total assets, (3) current assets / current liabilities, (4) net sales / current assets, (5) current assets / total assets, and (6) total liabilities / owners' equity.

⁵⁷ They removed change in cash and marketable securities funds flow components to avoid statistical overidentification.

⁵⁸ In this study, the definition of working capital is the change in working capital components except the changes in (i) cash and marketable securities (ii) short-term debt. These components were excluded.

a scale measure, total net flow/ total assets. Their sample size was 66 U.S. firms, 33 bankrupt firms and 33 non-bankrupt firms, over the period from 1970 to 1981.

The results from logit analysis⁵⁹ showed that: (i) classification accuracy ranged from 83%, one year before failure, to 77% when using the mean of each component three years before failure, and (ii) the dividends component was the only significant variable for both time periods. It should be noted that cash flow from operations is the sum of three components: (1) funds flow from operations, (2) working capital, and (3) fixed coverage expenses, and according to the finding of this study, no one of these three components was statistically significant. These results which showed that cash flow from operations does not improve the classification ability of the model are consistent with those of Casey & Bartczak (1984 & 1985).

(4) Gentry et al. (1985 B)

In a follow-up study, Gentry et al. (1985 B) employed the same sample and eight funds flow components as in the previous study (1985 A). In this study, they divided the working capital component into five components: (1) receivables, (2) inventory, (3) other current assets, (4) payables, and (5) other current liabilities. The final funds flow model consisted of 12 components; 7 components employed in their previous study (1985 A) and 5 components of working capital instead of the working capital component itself. The results from probit analysis showed that: (i) classification accuracy ranged from 88%, one year before failure, to 79% when using the mean of each component three years before failure, (ii) again, dividends component was the only significant variable for both time periods, and (iii) capital expenditures (investment) and receivables components were statistically only significant for one year before failure. In general, these results are consistent with their previous study (1985 A). Then, they assessed whether financial ratios are a more reliable source of information to predict bankruptcy than the funds flow components. They selected seven accrual ratios that previously proved successful in predicting bankruptcy plus two other ratios: one

⁵⁹ In this study, Gentry et al. employed three techniques: (i) MDA, (ii) logit analysis, and (iii) probit analysis. Only the results from logit analysis have been presented because the three techniques produced similar results.

for size and one for market value⁶⁰. Two additional probit models have been estimated for one year before failure: (i) a combined model which contained 12 funds flow components and the nine accrual ratios, (ii) and a traditional model that contained only nine accrual ratios.

The results of the combined model showed that only dividend was significant at the 5 percent level of confidence and the capital expenditures (investment) and receivables components were significant at 10 percent. None of the accrual ratios was significant. To assess whether the nine accrual ratios or the twelve funds flow components provide additional disseminating information, they compared the explanatory power⁶¹ of the combined model with the traditional and funds flow model. Comparing the combined model with the traditional model showed that the combined model's increase in explanatory power was significant at the 1 percent level of confidence. Comparing the combined model with the funds flow model showed that the combined model's increase in explanatory power was significant at the 5 per cent level of confidence. Gentry et al. (1985 B) concluded that "although both measures provide additional discriminating information when they are combined, the funds flow components more reliable signal" (P. 54).

(5) Gentry et al. (1987)

In a second follow-up study, Gentry et al. (1987) applied the same methodology as Gentry et al. (1985 B) and extending their analysis to a secondary sample of 23 weak (but not failed) and 23 healthy firms. The secondary sample results confirmed the results of Gentry et al. (1985 B).

(6) Gombola et al. (1987)

Gombola et al. (1987) examined the usefulness of cash flow from operations in predicting failure over two separate time periods. In this study, the central question was whether cash flow from operations is important in predicting corporate failure after the mid-1970s. They argued that, if cash flow had been found to be significant in early studies which employed net income before

⁶⁰ These nine accrual ratios were: (1) net income / total assets, (2) earnings before interest and taxes / total assets, (3) total debt / total assets, (4) cash flow / total debt, (5) net working capital / total assets, (6) current assets / current liabilities, (7) cash plus marketable securities / current liabilities, (8) nature log of total assets, and (9) market value of equity / book value of equity.

⁶¹ For comparing among these three models, they employed likelihood ratios tests

depreciation as a surrogate for cash flow from operations, it would probably be due to the high collinearity between earnings and this crude measure of cash flow. The fact that more recently (in the late period) cash flow from operations has been defined properly allows the examination of the effects of cash flow "cleanly" as a predictor of corporate failure. They selected 154 U.S. firms (77 bankrupt firms and 77 non-bankrupt firms) pair-matched by industry and size, over the period from 1967 to 1981. Their sample was divided into two separate periods: (i) early sub-sample period from 1967 to 1972, and (ii) late sub-sample period from 1973 to 1981. Four linear MDA models were estimated⁶² for one through four years before failure for each period and for the combined period. The first model consisted of six accrual ratios, as the base model, and each model from the other three models included combinations of the six accrual ratios and one fund flow measure from three alternative funds flow ratios⁶³: (1) net income plus depreciations / total assets, (2) working capital from operations / total assets, and (3) cash flow from operations / total assets.

By examining the marginal improvement in classification accuracy for the late period of the base model and the combined model which consists of the six accrual ratios and cash flow from operations / total assets, the results showed that cash flow from operations / total assets ratio did not improve the classification accuracy for this late period. This means that this study did not support cash flow from operations as an important predictor of corporate failure. However, Gombola et al. (1987) concluded that

"The cash flow measure employed in our study is an estimate. Since it is calculated with error, the results are limited by the effectiveness of the estimation procedure. Our study might be replicated at a later time when firms report cash flow from operations". (P.64)

⁶² Before the estimation of the four linear MDA models, Gombola et al (1987) performed factor analysis on 24 financial ratios. The results of the factor analysis showed that: first, there are six accrual ratios had the highest loading. These six accrual ratios were used in the first multiple discriminant analysis (MDA) model, the base model. These six accrual ratios were: (1) cash / total assets, (2) current assets / sales, (3) current debt / total debt, (4) sales / total assets, (5) total assets / total debt, and (6) net income / total assets. Second, net income and cash flow from operations are similar in the early period but dissimilar in the late period. Net income and cash flow from operations loaded on different factor in the late years and in the same factor in the early years. The correlation between net income and cash flow from operations was 36 % in the late year and 67% in the early years. Third, net income, working capital from operations, and net income before depreciation loaded in the same factor either in early years or late years.

⁶³ The reason for choosing these three ratios was that previous studies have used them.

(7) Aziz & Lawson (1989)

Aziz & Lawson (1989) compared the classification accuracy of Altman's Z-score (1968) and Altman's et al. (1977) ZETA™ model⁶⁴ with both (i) a cash flow-based (CFB) model developed by Lawson's cash flow identity⁶⁵ (1985), and (ii) a mixed model consisted of Altman's Z-score and Lawson's cash flow identity variables. Five variables scaled by total value of assets were included in Lawson's cash flow identity: (1) operating cash flow, (2) taxes paid, (3) net capital investment (4) liquidity change, and (5) lender cash flow⁶⁶. The study was conducted on U.S. data with a sample of 49 bankrupt firms during the period 1973-1982 matched with 49 non-bankrupt firms. They employed logit analysis for each year up to five years prior to bankruptcy.

The results showed that: (i) the overall accuracy was about the same for all the models tested, (ii) Lawson's cash flow identity and mixed model were more accurate in identifying the classification accuracy of bankrupt firms one and two years before bankruptcy, and (iii) Lawson's cash flow identity and mixed model were less accurate in identifying the classification accuracy of non-bankrupt firms one and two years before bankruptcy. These results were validated using a holdout sample of 26 bankrupt firms along with 67 matched non-bankrupt firms⁶⁷. Aziz & Lawson concluded that "operating cash flow, lender cash flow, net capital investment, and taxes paid are important variables for bankruptcy prediction" (P. 62).

(8) Ward (1994)

Ward (1994) investigated why net income plus depreciation and amortization scaled by total debt (NOF) was one of the strongest predictors of financial failure in early financial failure studies (e.g., Beaver 1966). Two main possible reasons for NOF's strong predictive power have been investigated. First, NOF is a naive

⁶⁴ For more details about Altman's et al. (1977) ZETA™ model see for example White et al. (2001), chapter 18.

⁶⁵ For more details about Lawson's cash flow identity see chapter 2, section 2.3.1.

⁶⁶ Aziz & Lawson (1989) excluded shareholder cash flow to avoid statistical over-identification.

⁶⁷ Since Altman's et al. (1977) ZETA™ model's parameters and design of the model remain proprietary, Aziz & Lawson were unable to compare ZETA™ model with the other models using the holdout sample data. However, they conducted these comparisons on the original sample data by using the error rates of ZETA™ model originally reported by Altman's et al. (1977).

measure of operating cash flow. Second, NOF is a better measure of economic income.

In contrast to most failure studies which used a dichotomous dependent variable, bankruptcy versus non-bankruptcy, Ward defined failure broadly to include reduction of dividends and loan default or debt accommodation, in addition to bankruptcy. In his analysis, he distinguished between four states: (1) healthy firms, (2) firms which experienced a greater than forty percent reduction in dividend per share, (3) firms which experienced a loan principal / interest default or debt accommodations, and (4) firms which filed for Chapter XI protection.

The sample consisted of 227 U.S. firms (164 healthy firms and 22, 23, and 18 firms for the other three failure events, respectively), over three years from 1984 / 1985 to 1986 / 1987. He estimated two ordinal four-state logistic prediction regression models for each year of the three years before financial distress to predict financial distress of year 1988 firms. The first model (the established model) contained the six accrual-based ratios used by Casey and Bartczak (1984, 1985), total assets to control for size effects, and cash flow from operations scaled by total liabilities (CFFO), whereas, the second model (full model) contained the same variables of the first model plus net income before depreciation and amortization scaled by total liabilities (NOF). The predictive accuracy of each model is then validated with a holdout sample of 158 U.S. firms, for year 1989, divided as follows: 111 healthy firms and 17, 14, and 16 firms for the other three failure events, respectively.

The emphasis was placed on the results of the full model, the impact of adding NOF to the established model, if NOF is a naive measure of operating cash flow, then NOF should not be significant when included in the full model with CFFO (the more refined CFFO variable should dominate NOF). However, if NOF is an alternative measure of economic income, then NOF should be significant and dominate NITA⁶⁸. The results⁶⁹ for the established model showed that CFFO is the strongest predictor one and two years before financial distress followed by

⁶⁸ NITA is one of the six accrual-based ratios employed in this study and equals net income / total assets.

⁶⁹ For more about measuring the predictive strength in this study, ranked probability scores, see Ward (1994).

NITA. The results of the full model showed that NOF dominates NIT where NITA was no longer significant in any year from the three years and NOF was significant in year two before financial distress and CFFO is still significant one year before financial distress. Ward concluded that "NOF is a significant predictor of financial failure because NOF is a better measure of economic income than NITA, not because NOF is a naïve measure of operating cash flow" (P.553)

(9) Huyghebaert et al. (2000)

Huyghebaert et al. (2000) examined whether the start-up manner influences survival of new firms. The study addressed this question: do the differences in operating activities, financial and investment decision (differences in Start-up characteristics) between the new firms, which start recently in marketplace, influence post-entry survival? In other words, the objective of this study was to detect which start-up characteristics (in this study these characteristics are represented in the measures of funds flow and traditional accrual ratios) are informative for predicting the post-entry survival of new firms. More specifically, the study sought to answer the following questions: (i) which measures of funds flow and which traditional financial accrual ratios are more important for the new firms? (ii) Are these two kinds of measures equally important? Or are the measures of funds flow more superior to traditional accrual ratios for predicting the post-entry survival of new firms?

To carry out the previous objectives, Huyghebaert et al. collected information about the Belgian firms which started in the year 1985. After five year, in 1990, they collected information again about the same firms. The study determined which firms, from those started in 1985, failed and which were still survivors. The final sample consists of 823 firms that had started in 1985; of these by 1990, 81 firms were classified as failed; the remaining 742 enterprises were classified as survivors. The measures examined were: (i) the funds flow components which were based on the components of cash-based funds flow model used in Gentry et al. (1987)⁷⁰ with slight adjustments⁷¹, (ii) seven accrual tradition ratios⁷², and (iii)

⁷⁰ For more details about these components see the study of Gentry et al. (1987) above in this section.

⁷¹ Three adjustments have been made from Gentry's et al. (1987) cash-based funds flow model. First, the operating cash flow component was decomposed into three components which are:

two control variables; one for the size effects (measured by the natural log of the total assets) and the other for the industry effects measured by the industry exit rate which is defined as follows: the number of firms exiting in a given calendar year divided by the total number of firms in the industry in the prior year⁷³.

They estimated two logit models for the first-year after foundation of each firm (each firm's start up year), the first one contains only funds flow components and the second one (the combined model) combines funds flow components and traditional financial ratios. The results⁷⁴ of this study pointed out that the fund flow components are more important and superior to traditional ratios for predicting the post-entry survival of new firms where most of the funds flow components were significant either in the first or the second model. The traditional ratios were not significant in the second model (the combined model). The results of this study can be summarised as follows: (i) firms with a high operating cash flow component relative to their total sources in the year of start-up are more likely to survive (all components of cash flow from operations were significant), (ii) failed firms obtain a significantly higher proportion of their funds from external financial (the financing flow component was significant), (iii) failed firm use significantly more trade credit granted by their suppliers and invest less in inventories (both the change in inventory and in payables were significant). These results suggested that failed firms compensate liquidity constraints at start up by controlling their working capital, (iv) firms with a lower proportion of funds invested in cash and marketable securities in the year of start-up are more likely to fail (the change in cash and marketable securities

gross margin, labour expenses and a residual component (which includes other operating expenses, financial revenue and income from extra-ordinary activities). Second, the financial funds flow component was decomposed into two components equity and financial debt. Third, a combination of other current assets and other current liabilities into one component and the removal of other asset and liability flow component. So, the final fund flow components in this study consisted of 13 components and each component is divided by the total assets.

⁷² These accrual ratios were: (1) net income / total assets, (2) earnings before interest payments and taxes / total assets, (3) total debt \ total assets, (4) cash flow \ total debt, (5) net working capital / total assets, (6) current assets/ current liabilities, and (7) cash and marketable securities / current liabilities.

⁷³ They used the historical exit rate observed in 1985.

⁷⁴ The univariate results suggested a greater discriminatory power of the traditional financial ratios. All the traditional ratios are significantly different between failed and surviving firms. On the average, failed firms are less profitable, less solvent, and less liquid in the year of start-up. For the control variable, only size is significantly different between the two groups of firms. Most of the fund flow measures are not significant.

component was significant), (v) traditional accrual ratios do not contribute incrementally to the funds flow variables in a multivariate model, and (vi) the two control variables did not contribute significantly in distinguishing between failed versus non-failed firms.

3.2.4 Main conclusion

The main conclusions derived from the early studies on the usefulness of cash flow from operations in predicting bankruptcy were mixed. However, several studies supported the ability of funds flow investment and financing components in addition to accrual information to predict bankruptcy (see Gentry et al., 1985 A; Gentry et al., 1985 B; Gentry et al., 1987; Aziz & Lawson, 1989). It can be concluded that funds flow components can help to improve the classification accuracy of bankruptcy models and these components have been found to be statistically significant in bankruptcy prediction models alone or in combination with accrual ratios. Neill et al. (1991) in their review of the usefulness of cash flow in the prediction of financial failure suggested giving greater attention to the definition of the event of interest; failed firms can work with negative cash flow and this suggests limitations with using bankruptcy as definition of failure. So the significant role of cash flow from operations in prediction of financial failure may exist when failure is defined more broadly than bankruptcy (e.g., Ward 1994).

3.3 Cash flow information and prediction of future cash flow

3.3.1 The importance of prediction of future cash flow

In the Statement of Financial Accounting Concepts (SFAC) No.1: Objectives of Financial Reporting by Business Enterprises, the Financial Accounting Standards Board (FASB) asserts that financial reporting should provide information about the cash flow of the firm. The FASB states that:

“Financial reporting should provide information to help investors, creditors, and others assess the amounts, timing, and uncertainty of prospective net cash inflows to the related enterprise” (Para.37).

The previous quotation underscores the need to delineate precisely the time series properties and predictive ability of cash flow expectation models where an accurate description of the process that generates measures of cash flow from operations has potential importance in a variety of decision contexts (Lorek et al., 1993; Lorek & Willinger, 1996).

Prediction of cash flow is crucial to valuation models. In addition, the primary objective of interest to investors is to evaluate the firm's ability to generate positive cash flow. Users of financial statements will have an interest in assessing the firm's future cash flow to the extent that these provide an indication of the firm's ability to pay dividends and interest, repay amounts borrowed, and so on (Neill et al., 1991).

3.3.2 The FASB's opinion on prediction of future cash flow

There are two main opinions in the area of prediction of future cash flow. First: accrual earnings are better than current cash flow for prediction of future cash flow. Second: cash flow has the ability better than earnings to predict itself.

The FASB adopts the first opinion. Specifically, the FASB position has been that accrual earnings can be used to provide a good estimation to the firm's future cash flow. FASB asserts that earnings numbers provide better forecasts than cash flow numbers of future cash flow. In Statement of Financial Accounting Concepts (SFAC) No.5: Recognition and Measurement in Financial Statement of Business Enterprises, the Financial Accounting Standard Board (FASB) shows that accrual information gives a better indication for predicting of future cash flow. The FASB states that:

"Statements of cash flows commonly show a great deal about an entity's current cash receipts and payments, but a cash flow statement provides an incomplete basis for assessing prospects for future cash flows because it cannot show inter-period relationships. Many current cash receipts, especially from operations, stem from activities of earlier periods, and many current cash payments are intended or expected to result in future, not current, cash receipts. Statements of earnings and comprehensive income, especially if used in conjunction with statements of financial position, usually provide a better basis for assessing future cash flow prospects of an entity than do cash flow statements alone" (Para. 24C).

3.3.3 Cash flow prediction studies

This section reviews some studies that assess whether earnings or current cash flow are better predictors of future cash flow⁷⁵.

(1) Bowen et al. (1986)

Bowen et al. (1986)⁷⁶ examined the predictive ability of (1) net income before extraordinary items and discontinued operations, (2) net income before extraordinary items and discontinued operations plus depreciation and amortization, (3) working capital from operations, and (4) cash flows from operations to predict one and two year ahead of cash flow from operations. Based on a sample size of 324 U.S. firms over the period from 1971-1981, they used the lagged, one and two years, value of variables 1 & 2 & 3 & 4 as predictor variables. For all firms in each year, they computed median absolute forecast errors of each predictor variable where the forecast errors of each predictor variable were defined as the difference between actual cash flow from operations and the lagged, one and two years, values of each one of the four predictor variables, this difference was scaled by the predictor variable. The median absolute forecast error of each predictor variable was assigned a rank each year relative to the median absolute forecast errors of other predictor variables. Then, they employed the average ranks of each predictor variable across years to compare the predictive accuracy of cash flow from operations among the four measures (the average was computed for 10 & 9 years when predict one and two years ahead of cash flow from operations respectively).

The results showed that net income before extraordinary items and discontinued operations plus depreciation and amortization (measure 2) and working capital from operations (measure 3) provide better forecasts of one- and two-period-ahead cash flow from operations than does last period's cash flow from operations (measure 4) or net income before extraordinary items and discontinued operations (measure 1). The statistical significance of the individual pairwise sign tests confirmed these results and showed also that measures 1 & 2

⁷⁵ For other studies, not presented here, about prediction of future cash flow see also Dechow et al. (1998) and Barth et al. (2001).

⁷⁶ For more details about this study see chapter 2, section 2.4

provide equivalent forecasts of one- and two-period-ahead cash flow from operations. These results do not support the FASB's statements that earnings are superior for predicting future cash flow.

They also predicted one and two year ahead of cash flow from after investments and changes in cash flow. The results showed that a random walk model performs at least as well as, and usually better than, predictions based on variables with fewer adjustments to reported accrual earnings. The results of pairwise sign tests confirmed these results and showed also that a random walk model and net income before extraordinary items and discontinued operations provide equivalent forecasts of one- and two-period-ahead of cash flow after investments.

(2) Wilson (1987)

Wilson (1987)⁷⁷ developed a multivariate, cross-sectional regression model for cash flow prediction. He employed the information in quarterly disclosures, which resulted in an innovative cross-sectional prediction models approach to modelling expectations (Neill et al., 1991). Based on a sample size of 322 firm-year observations over two years: (1981-1982), Wilson regressed a fourth-quarter cash flow from operations on a vector of information available at the earnings announcement. This vector consisted of 15 independent variables, fourth-quarter earnings and revenues for the current year and four lagged variables for: (i) revenues (ii) non-current accruals, (iii) current accruals, and (iv) cash flow from operations. These lagged variables were from third quarter and the first half of the current year and the fourth quarter of the previous year. Annual capital expenditures are also included. All these variables were deflated by the book value of total assets. Neill et al. (1991) criticised Wilson's model due to the following potential limitations: (i) it is a pooled time-series, cross-section of firms, which assumed that the parameters of the model are the same across firms and time. Hence, the difference among firms or across time is not incorporated in the expectation process, (ii) pooling the data over time and relying on the assumption of intertemporal parameter stability lead to use observations in subsequent years to predict previous year's cash flow, and (iii) the lagged values

⁷⁷ For more details about this study see chapter 4, section 4.3.1.1

of the explanatory variables are employed without justification for the length of time-series or their aggregation. Despite these potential limitations, Wilson's model exhibited an adjusted R^2 of 47.3 percent. However, Wilson reported that the inclusion of currently earnings and revenue numbers accounts for only 1.2 percent of the model's adjusted R^2 . This result suggests that a simple univariate model employing historical data may perform relatively well and may represent a good surrogate to the multivariate models (Lorek et al., 1993).

(3) Arnold et al. (1991)

Based on sample size of 171 UK firms over the period from 1965 to 1984, Arnold et al. (1991)⁷⁸ carried out a study similar to Bowen et al. (1986). They examined the predictive ability of (1) net income, (2) working capital from operations, (3) net quick flow (working capital from operations +/- stock change), and (4) cash flow from operations to predict one and two year ahead of cash flow from operations. Their finding was consistent with Bowen et al. (1986) and suggested that working capital from operations was the best predictor for one and two period forecasts. The results of pairwise sign tests confirmed these results and showed also that net quick flow was significantly better one period predictor than cash flow from operations and cash flow from operations was a significantly better two period predictor than net quick flow.

They also predicted one and two year ahead of (i) cash flow from after investments, (2) cash change, and (3) entity cash flow (cash flow after investments minus cash change). The results showed that a random walk and its two period equivalent provided the best predictions. The results of pairwise sign tests confirmed these results and showed also that a random walk model and net income provide equivalent forecasts of two-period-ahead of cash flow after investments and cash flow after investments was a better one period predictor of itself than net income. Regarding entity cash flow, the results of pairwise sign tests showed that entity cash flow was a significantly better predictor of itself than net income for both one and two period ahead.

⁷⁸ For more details about this study see chapter 2, section 2.4

(4) Lorek et al. (1993)

Lorek et al. (1993) investigated two main issues. First, they examined the statistical patterns (e.g., seasonality, and autocorrelation) of the quarterly cash flow from operations and working capital from operations series. Second, they compared the predictive ability of forecasts of quarterly cash flow from operations and working capital from operations generated by multivariate cross-sectional expectation models that restrict the coefficients to be the same across firms (they employed Wilson's 1987 multivariate cross-sectional regression model, mentioned before)⁷⁹ with univariate time-series models that permit firm-specific estimation of coefficients. The sample size consisted of 109 firms over the first quarter of 1976 to the fourth quarter of 1985 (forty observations for each firm).

Autocorrelation function has been computed over 36 quarters for the levels and the seasonally differenced of quarterly cash flow from operations and working capital from operations, beginning with the first quarter of 1976 and ending with the fourth quarter of 1984, for each of 109 firms for examination of the time-series properties (statistical patterns) of the quarterly cash flow and working capital from operations series. The results revealed that (i) the cash flow from operations series are consistent with purely seasonal characteristics ARIMA models which were able to capture the autocorrelation patterns in the cash flow from operations series, and (ii) the working capital from operations series are consistent with the dual process characterisation for quarterly earnings data. These findings suggest that it may be appropriate to model the cash flow from operations and working capital from operations series with models having distinct structural forms.

The results of autocorrelation function of the quarterly cash flow and working capital from operations series patterns lead to estimation of the following two models for cash flow from operations series: (1) (000) * (100), a seasonal autoregressive model (SAR), and (2) (000) * (011), a seasonally differenced, seasonal moving average process (SMA). For working capital from operations series, the results also led to estimate the following two models: (1) (100) *

⁷⁹ See Wilson's (1987) study.

(100), an autoregressive and seasonal autoregressive ARIMA model (ASA), and (2) (011) * (011), the Griffin-Watts (GW) characterisation.

They used the first 36 observations of data to estimate the parameters of the above time-series expectation models and the four quarterly observations in 1985 (a holdout period not used for model identification) (prediction period) were employed for predictive ability tests. The additional data requirements for estimating Wilson's (1987) model reduced the number of firms to 80 firms. They also obtained four additional quarters of data in year 1986, which resulted in a reduced sample of 80 firms. The additional data requirements for estimating Wilson's (1987) model reduced the number of firms for this sample to 66 firms. Cash flow from operation per share and working capital from operation per share were used as the input series for their time series modelling.

One-step ahead quarterly cash flow prediction and working capital from operations were generated by estimating all the models using data beginning with the first quarter of 1976 and ending with the fourth quarter of 1984 to generate cash flow prediction for the first quarter of 1985. All models were re-estimated by adding the actual first quarter cash flow of 1985 to the data base prior to generating the second quarter cash flow prediction in 1985. This process was repeated and the models were re-estimated until all one step ahead cash flow predictions over the two year holdout period (1985-1986) were obtained.

Mean absolute percentage error⁸⁰ (MAPE) was employed to compare the predictive accuracy of cash flow from operations and working capital from operations generated by ARIMA-based models (mentioned above) versus the pooled cross-sectional regression model developed by Wilson (1987)⁸¹. Based on the pooled MAPE metric and MAPE of the most of the eight quarters, the results showed that univariate time-series models of cash flow from operations and working capital from operations generate more accurate forecasts than the multivariate cross-sectional regression models. The Wilcoxon matched pair

⁸⁰ Lorek et al. (1993) used also mean squared error to compare the predictive accuracy of cash flow from operations and working capital from operations series among the models have been estimated. The results remain qualitatively the same as using Mean absolute percentage error.

⁸¹ For more details about Wilson's (1987) model see Wilson's (1987) study mentioned earlier in this chapter.

comparisons confirmed these results. This finding is counter to the FASB's perspective on cash flow prediction.

(5) Finger (1994)

Finger (1994) examined the ability of earnings and cash flow from operations to predict future cash flow from operations one through eight years ahead using annual data for 50 firms over the period from 1935 to 1987. Three firm-specific regression models have been estimated. The first model was employed to test the predictive ability of current earnings to predict future cash flow from operations. This model included future cash flow as a dependent variable and current earnings as an independent variable. The second model was employed to test the predictive ability of current cash flow to predict future cash flow from operations. This model included future cash flow as a dependent variable and current cash flow as an independent variable. The third model was employed to test the predictive ability of current earnings and current cash flow from operations together to predict future cash flow from operations. This model included future cash flow as a dependent variable and both current earnings and current cash flow from operations as independent variables.

The results of model 1 and 3 showed that earnings, used alone and together with cash flow are a significant predictor of future cash flow, in sample for approximately 90 % of the sample firms.

Regarding out-of-sample forecast, the three models have been estimated for each firm for the full period over the year 1935 to 1987 by using the first two lags of the independent variables. Firm-specific root mean square errors were computed for the one, four, and eight year ahead forecasts for each of the three models. The percentage difference between firm-specific root mean square errors from two models is computed firm by firm and the distributions of these differences of 50 firms are grouped by the magnitude of the percentage differences. The performance of the models is viewed as similar if the difference is between -10% and 10%. Otherwise one model is viewed as outperforming the other.

The distribution of differences of the root mean square errors of the second model and the third model has been examined to assess the additional

contribution of earnings to improve cash flow forecasts. The results indicated that for most of the sample firms, the model with both earnings and cash flow from operations variables does not outperform the model with cash flow only.

The distribution of differences of the root mean square errors of the first model and the second model has been examined to assess whether current earnings or current cash flow from operations are better predictors of future cash flow. The results showed that cash flow is a superior predictor for short horizons (for one-year-ahead forecasts), and that earnings and cash flow are approximately equivalent for long horizons.

These results indicate that earnings help predict cash flow but do not support the FASB viewpoint that earnings are a better predictor of cash flow than cash flow alone.

(6) Lorek & Willinger (1996)

Lorek & Willinger (1996) developed a new multivariate time series prediction model that employs past values of earnings, short term accruals and cash flow as independent variables in a time-series regression and allows firm specific parameter estimation to predict quarterly future cash flow from operations. In this multivariate time series prediction model, they regressed current cash flow from operations on seven independent variables. These variables were the lagged values of cash flow from operations at time $t-1$ and $t-4$, operating income before depreciation at time $t-1$ and $t-4$, accounts receivable at time $t-1$, inventory at time $t-1$, and accounts payable at time $t-1$.

They compared the predictive ability of forecasts of one step ahead quarterly cash flow from operations generated by their new multivariate time series prediction model versus Wilson's (1987) multivariate cross-sectional expectation model that restrict the coefficients to be the same across firms⁸² versus common

⁸² See Wilson's (1987) study.

structure ARIMA models used in the study of Lorek et al. (1993)⁸³ versus firm specific ARIMA models⁸⁴.

Three forms of cash flow series were tested: (1) undeflated cash flow, (2) cash flow per share, and (3) cash flow deflated by total assets. They employed quarterly cash flow from operations over the second quarter of 1979 to the fourth quarter of 1991 (fifty one quarters for each firm). The initial model identification period included the first 39 quarters of data and the other 12 quarters within the 1989, 1990, and 1991 were employed as a holdout period for predictive ability tests. The final sample size consisted of 62, 61, and 51 firms through 1989, 1990 and 1991, respectively. One-step ahead quarterly cash flow prediction were generated by estimating all the models using data beginning with the second quarter of 1979 and ending with the fourth quarter of 1988 to generate cash flow prediction for the first quarter of 1989. All models were re-estimated by adding the actual first quarter cash flow of 1989 to the data base prior to generating the second quarter cash flow prediction in 1989. This process was repeated and the models were re-estimated until all one step ahead cash flow predictions over the three year holdout period (1989-1991) were obtained.

Mean absolute percentage error⁸⁵ (MAPE) was employed to compare the predictive accuracy of cash flow from operations among the all models and the accuracy of cash flow prediction was assessed by using Frideman ANOVA ranks test. The results for undeflated cash flow showed that there was a statistically significant difference in the average ranks of the prediction models for each quarter as well as on a pooled basis. The best model was the multivariate time series prediction model. The pairwise-comparisons based on the significant Fridman ANOVAs for each quarter and on pooled basis confirmed these results and showed that the multivariate time series prediction model exhibited

⁸³ As Lorek et al. (1993), the common structure ARIMA models which were employed were (1) (000) * (100), a seasonal autoregressive model (SAR), and (2) (000) * (011), a seasonally differenced, seasonal moving average process (SMA). See Lorek's et al. (1993) study.

⁸⁴ The most frequently identified firm specific ARIMA structure was (000) * (011), a seasonally differenced, seasonal moving average process (SMA).

⁸⁵ Mean squared error also was employed to compare the predictive accuracy of cash flow from operations among the estimated models. The results remain qualitatively the same as using Mean absolute percentage error.

significantly smaller ranks than all other models. The results were unaltered for cash flow per share or cash flow deflated by total assets.

(7) Pfeiffer et al. (1998)

Pfeiffer et al. (1998)⁸⁶ compared the predictive accuracy of random-walk model⁸⁷ with a model that incorporates the historical auto- and cross-correlation among earnings components (the serial dependency-based predictions) for prediction of cash flow from operations. In the historical auto- and cross-correlation model, they regressed current cash flow on the first lagged values of (i) earnings, (ii) working capital from operations, and (iii) cash flow from operations. These variables were defined as the per share values scaled by share price at the beginning of the fiscal year. Based on a sample size of 22,253 U.S. firm-years with a December year end covering the period from 1981 to 1996, they estimated their model for each year using all observations available from prior years. Mean squared prediction error metric for each year (mean squared difference between the actual and predicted value of cash flow from operations)⁸⁸ has been employed to compare the predictive accuracy of cash flow from operations between the two techniques over 16 years. Their finding showed that current period expectations for cash flow from operations that are conditioned on the three lagged values are more accurate than random-walk expectations at probability value below 0.01.

3.3.4 Main conclusion

The time series behavior of the cash flow is in marked contrast to the models typically employed for accounting earnings. The multivariate time series prediction model developed by Lorek & Willinger's (1996) study outperforms both the multivariate cross-sectional regression model used in Wilson's study (1987) and the common structure ARIMA models used in the study of Lorek et al. (1993). In general these results are consistent with the FASB's viewpoint that cash flow prediction is enhanced by consideration of earnings and accrual

⁸⁶ For more details about this study see chapter 4, section 4.3.2.1

⁸⁷ The random-walk prediction of cash flow from operations for the current year is the level of cash flow from operations in the prior year.

⁸⁸ They employed other two techniques: (i) product-moment correlation of realised and predicted values, and (ii) the correlation of size-adjusted securities returns and unexpected changes in cash flow from operations. These two techniques led to the same inferences which were captured from mean squared prediction error metric.

accounting data. This new multivariate time series prediction model, unlike multivariate cross-sectional expectation model, allows firm specific parameter estimation and, unlike the ARIMA models, incorporates a parsimonious set of accrual accounting variable in addition to past values of cash flow. As suggested by Lorek & Willinger (1996), additional refinements of multivariate modelling structures on an industry-specific basis may further enhance the ability to predict future cash flow. In addition, further extension includes disaggregating quarterly cash flow into operations, investing and financing components.

3.4 Cash flow information and capital market studies

Information content of cash flow and earnings studies are considered an area within market-based accounting research (MBAR). According to this approach, stock returns or stock prices are viewed as encompassing both cash flow and accrual information when evaluating a firm's performance. So, stock returns or stock prices are used as a benchmark to evaluate the information content of cash flow and accrual information. These studies follow the same methodology of the studies that examine the information content of earnings (earnings return relation) and can be considered an extension. This methodology can be classified into either event studies or association studies.

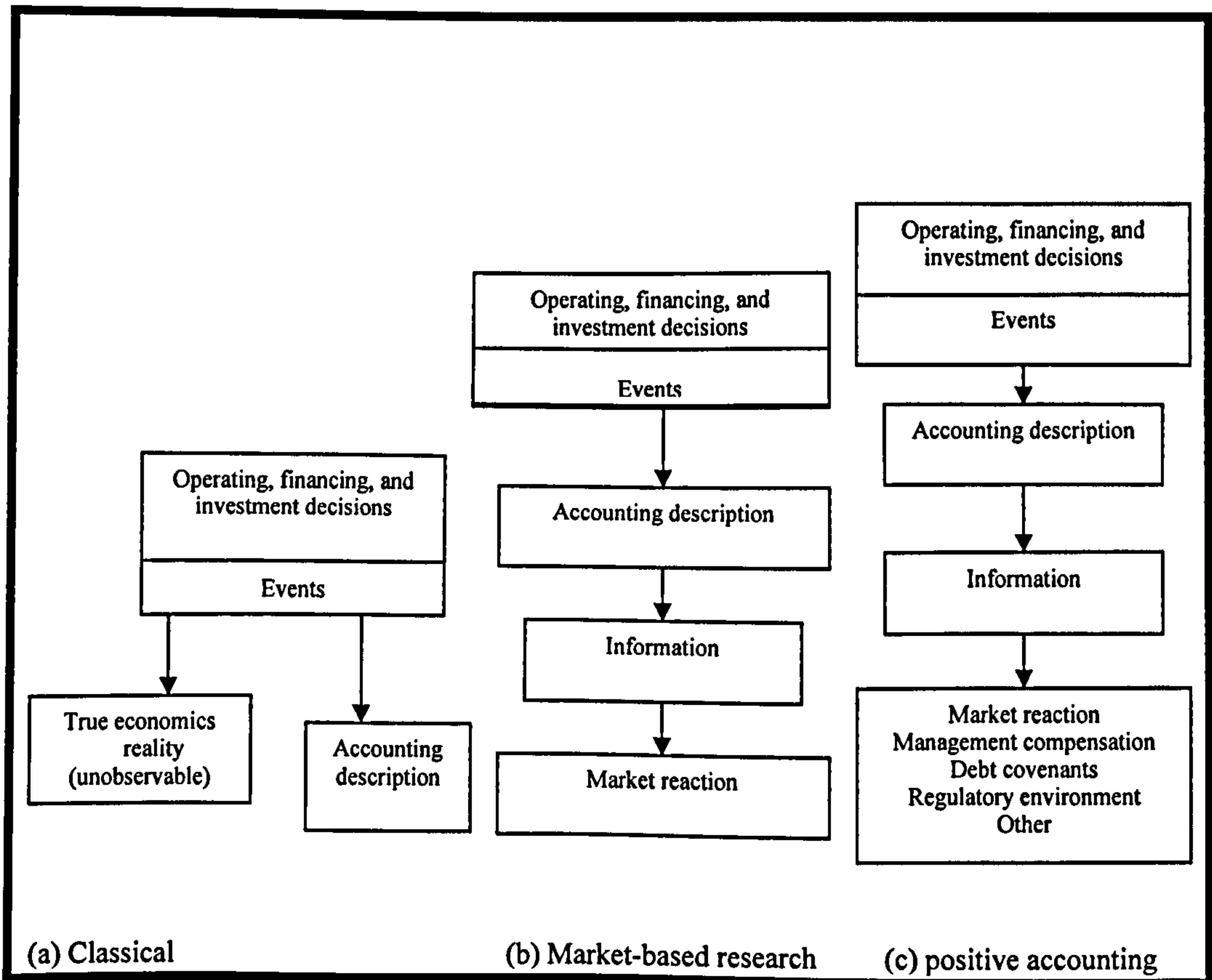
In the light of the above introduction, it will be useful to divide this section into market-based accounting research (MBAR), earnings return relation, and the information content of cash flow and earnings.

3.4.1 Market-based accounting research (MBAR)

Watts & Zimmerman (1986, chapter 1) divided the evolution of accounting theory into three stages. First, the descriptive approach; second, the normative approach; and third, the positive approach. They also referred to other approaches in the literature (e.g., the behavior approach).

White et al. (2001, chapter 5) classified the current trends in accounting research into three main approaches. First, the classical approach; second, market-based accounting research (MBAR); and third, positive accounting theory, see figure 3-1.

Figure 3-1 the three approaches of the research to accounting theory. Source: White et al. (2001, P. 164)



During the late 1960s and throughout the 1970s, many accounting academics adopted the economics-based empirical research as a theoretical framework for financial accounting. This led to three major approaches to financial reporting: first, information economics; second, market-based accounting research (MBAR); and third, positive accounting theory (Walker, 1997).

Glautier & Underdown (1997, chapter 3) stated that the development of accounting theory evolved from three major approaches. First, the descriptive approach. Second, the decision usefulness approach which includes two sub-approaches: (i) the normative approach, and (ii) the empirical approach. Third, the welfare approach.

More details regarding the descriptive approach, normative approach, and positive accounting theory as main three stages to the development of accounting theory as mentioned before by Watts & Zimmerman are discussed next.

Chapter 3

The descriptive approach was prominent in the late nineteenth and early twentieth centuries where financial reporting and auditing was largely voluntary and accounting was unregulated (Scott, 2003, Chapter 1). It was concerned with describing observed practices and with providing rules for classifying those practices to provide insight into the reasons for a particular practice without any attempt to structure sets of principles to explain accounting practice in general (Watts & Zimmerman, 1986, chapter 1).

The normative, or classical approach, appeared after 1933 and 1934 as a result of the U.S. securities acts, which regulated disclosure by firms listed on stock exchange and which established the Securities and Exchange Commission (SEC). The normative approach represents classical accounting research which is concerned mainly with prescribing how firms should report and what should be done (Watts & Zimmerman, 1986, chapter 1). White et al. (2001, chapter 5) described the main characteristics of this approach as follows.

1. The users of financial statement accept and react to those statements at face value. So, issues such as (i) current cost versus replacement cost versus historical cost accounting frameworks, and (ii) what is the best method for valuation of assets, for valuation of inventory and for computing the depreciation represented the main interests in this approach (Watts & Zimmerman 1986, chapter 1).
2. This approach assumes that the nature of users' reactions to financial information is deemed predictable; hence, the empirical work to examine the relation between accounting information and user's reactions to this information received little concern.

In this way, "This approach attempts, using a theoretical perspective, to develop an optimal or "most correct" accounting representation of some true (but unobservable) reality" (White et al., 2001, chapter 5). This approach is still the framework underlying much of existing accounting regulation to develop conceptual frameworks for financial reporting (Glautier & Underdown 1997, chapter 3).

Regarding positive accounting theory and market-based accounting research (MBAR), It should be clear that MBAR, which appeared in late 1960s and early 1970s, represented the early economics-based empirical research studies in

accounting which tested hypotheses in the existing accounting literature and investigated the relation between accounting numbers and economic variables and the time series of accounting numbers (Watts & Zimmerman 1986, chapter 1). These early studies did not give any attention to the explanation of accounting practice. On the other hand, positive accounting theory broadens the observation of market reactions to accounting numbers, which represent the main focus of market-based accounting research, in two ways (White et al., 2001, chapter 5, PP. 164: 165):

"First: in addition to financial markets, it includes other environments influenced by financial statements: management compensation plans, debt agreements with creditors, and the host of regulatory bodies interacting with the firm. Second and more important, it recognizes that since financial statements impact these other environments, there are incentives for accounting systems to be used not only to measure the results of decisions but, in turn, to influence these decisions in the first place. This feedback interaction can influence both management's operating decisions and accounting choices".

In positive accounting theory, the crucial question for an accounting theorist is why accounting and auditing practice are the way they are (Watts & Zimmerman, 1986, chapter 1). Positive accounting theory research hypothesises efficient or opportunistic earnings management and/or seeks to explain managers' accounting procedure choices (Kothari, 2001).

Watts & Zimmerman (1986, chapter 1) mentioned the following three reasons of the emerging of the positive accounting theory.

1. The development of theories of finance that had the potential to explain practice such as the systematic variation in debt/equity ratio.
2. The systematic behavior in accounting practice; for example, changing from accelerated depreciation method to straight line method, by the mid-1970s suggested that a theory could be developed to explain practice by the developments in finance.
3. The ongoing debate over the desirability of government regulation of financial disclosure led accounting researchers adopting the assumption that politicians and bureaucrats like managers and accountants try to maximize their own welfare and use this assumption to model the effect of regulation on accounting practice.

Since this study adopts market-based accounting research (MBAR) to test its hypotheses and to achieve its objectives, more details about this approach now follows.

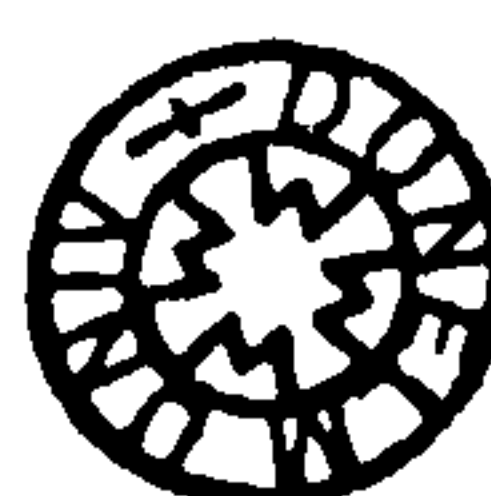
Advances in finance theory in the mid-and late 1960s were the primary tools which facilitated the shift in accounting research to MBAR especially efficient market hypothesis (EHM) and modern portfolio theory (White et al., 2001, Chapter 5). Walker (1997) determined the following key influences as reasons for the emergence of market-based accounting research (MBAR).

1. The emergence of positive economics in the U.S. as the dominant research paradigm which has led to a questioning of the scientific integrity of income measurement theorists who gave little attention to the empirical test for their idea.
2. The early successes of research on market efficiency which have been facilitated by the availability of computer-based share price and econometrics packages.
3. The growing need for a more sophisticated understanding of the needs of the users of accounting information.

MBAR is built upon the efficient market hypothesis (EMH) which proposes that capital markets are both efficient and unbiased (Williams, 1995). According to Fama (1970) "A market in which prices always "fully reflect" available information is called efficient". (P. 383)

Fama (1970) distinguishes among three types of market efficiency: the weak form, the semi-strong form, and strong form. The weak form asserts that stock prices already reflect fully all information that can be derived by examining the movements of the historical stock prices. The semi-strong form asserts that stock prices reflect fully all publicly available information (e.g. announcements of annual earnings, stock splits, etc.). Finally, the strong form states that stock prices reflect all information including information available to insiders.

EMH can be considered a maintained hypothesis in the MBAR studies. The important issue to mention here is that the semi-strong form of the hypothesis is



relevant to accounting research because publicly available information includes financial statements (Belkaoui, 2004, Chapter 12).

As stated before, market-based accounting research which appeared in late 1960s and early 1970s represents the early economics-based empirical research studies in accounting. MBAR examines the relation between capital markets and accounting information contained in financial statements. Specifically, this approach seeks to find out if this accounting information has information content. Brown (1994) explains the information perspective as follows.

"The information perspective is the view that accounting earnings is a signal that is informative, for whatever reason. That perspective leads to the question, what are the properties of signals that are informative? They change investors' beliefs, and the changes are sufficient to change their behaviour. Forecast errors, being the unexpected or surprise component, are the informative part of the earnings signal. Changes in security prices are one observable measure of systematic changes in investors' beliefs". (P. 24).

MBAR seeks to answer a wide range of questions. A sample of the questions examined in previous research includes (Kothari, 2001):

- Do current cost earnings have incremental information content over historical cost earnings?
- Do differences in corporate governance structures affect the degree of information asymmetry in capital markets and, in turn, influence the timing and strength of the relation between security returns and earnings information?
- Does managerial ownership affect the informativeness of accounting numbers because of the separation of corporate ownership and control?
- Does the perceived quality of an auditor affect the relation between corporate earnings and security returns?
- How does the reporting of transitory gain as part of ordinary income and transitory loss as an extraordinary item affect prices?
- How do we test for the capital market effects of accounting method changes?
- Are disclosures about other post-retirement employee benefits (OPEB) value relevant?

- Does an economic value added (EVA[®]) performance measure correlate more highly with stock returns and prices than historical cost accounting earnings?
- What would be the consequence of the Securities and Exchange Commission discontinuing the requirement of reconciliation between the US GAAP and the foreign- or the International Accounting Standards-GAAP for the non-US firms seeking to list their shares on the US exchanges and raise capital in the US?
- Would financial statements be more informative about current economic income (i.e., change in the market value) if GAAP were changed to permit managers to capitalize R&D outlays?

MBAR can be classified into three categories: tests of the efficient market hypotheses (EMH) versus the classical approach, tests of the information content of accounting alternatives, and tests of the earnings return relationship (White et al. 2001, chapter 5).

Lev & Ohlson (1982) evaluated in-depth the research in the 1970s on the relationship between publicly disclosed accounting information and the consequences of the use of this information by equity investors. They concluded that accounting information, especially earnings data, conveys useful and timely information to investors.

Kothari (2001), in his review paper on capital markets research in accounting, surveyed a huge amount of work from the late 1980s and 1990s regarding accounting information and capital market. He categorized the demand for MBAR into the following five main areas: (1) methodological capital market research, (2) evaluation of alternative accounting performance measures, (3) valuation and fundamental analysis research, (4) tests of market efficiency, and (5) value relevance of disclosures according to various financial accounting standards and economics consequences of new accounting standards.

In their review paper, Dumontier & Raffournier (2002) presented the most recent studies on accounting and capital markets. Their article examined the corresponding European evidence to the studies that have been conducted in the U.S. on the relation between accounting information and capital markets.

Dumontier & Raffournier (2002) classified their work into three groups: (i) studies of the market reaction to newly released accounting information, (ii) studies of the long-term association between stock returns and accounting numbers, and (iii) studies devoted to the use of accounting data by investors and the impact of market pressure on accounting choices.

Following Dumontier & Raffournier (2002), the methodology of studies on capital market research in accounting can be classified into two main groups. First, the studies of market response to accounting information or event studies (Short window interval). Second, the studies of the association between stock returns and accounting information or association studies (long window interval).

Event studies are defined as follows.

"In an event study, one infers whether an event, such as an earnings announcement, conveys new information to market participants as reflected in changes in the level or variability of security prices or trading volume over a short time period around the event" (Kothari, 2001, P. 116).

Strong (1992) defined event studies as follows." An event study is the name given to an empirical investigation of the relationship between prices and economics events" (P. 533).

Event studies examine the market reaction to the new information conveyed by an event about the amount, timing, and, and/or uncertainty of future cash flow that revised the market's previous expectations (Kothari, 2001). The information content of an event can be inferred from the mean abnormal returns, from the volatility of returns or from the change in volume trading over a short period around the event (Dumontier & Raffournier, 2002).

Examples of events studies include Ball & Brown (1968), Beaver (1968), Foster (1977), Wilson (1986 & 1987), Bernard & Stober (1989), and Ball & Kothari (1991).

Association studies are defined as follows.

"An association study tests for a positive correlation between an accounting performance measure (e.g., earnings or cash flow from operations) and stock returns, both measured over relatively long, contemporaneous time period, e.g., one year" (Kothari, 2001 P. 116).

Association studies incorporate a large number of information releases so they do not infer any causal relationship between accounting information and stock returns where it is difficult to dismiss the possibility of other, more timely, sources of information that reveal value relevant of firm valuation to the capital market (Neill et al., 1991). On this basis, the objective of the association studies is to test whether and how quickly accounting measures capture changes in the information set reflected in stock returns over a given period (Kothari, 2001).

Examples of association studies include Ball & Brown (1968), Beaver et al. (1980), Beaver et al. (1987), Rayburn (1986), Bowen et al. (1987), Collins & Kothari (1989), Strong & Walker (1993), Strong (1993), Ali (1994), and Cheng & Yang (2003).

As with any approach, the market based-research approach in accounting suffers from limitations. Walker (1997) shows the shortcoming of MBAR as follows.

1. The methodologies of the natural sciences are not appropriate to a subject like accounting.
2. This approach is based on highly unrealistic assumptions about human behavior but this is not the case in a complex subject like accounting.
3. Many theorists argue that laboratory studies and case studies tend to be viewed more favorably than using econometrics to test accounting issues.
4. Numerous studies have reported a relatively low association between unexpected earnings and stock returns.
5. This approach fails to provide policy makers with relevant results in some areas, for example, it is difficult to address issue like accounting for goodwill, and accounting for research and development within market-based empirical framework; such issues are traditionally discussed within an income measurement framework.

3.4.2 Earnings return relation

Earnings return relation studies were by far the most prevalent form of market based accounting research (White et al., 2002, chapter 5). These studies examine the existence of the information content of earnings. The relation is based upon the fact that earnings are used as a surrogate for cash flow (Watts & Zimmerman,

1986, chapter 2), and since (i) current earnings provide information about future earnings, and (ii) the value of the share equals the present value of the expected stream of earnings, changes in expectations about this stream will cause the price to change, enabling shareholders to make gains or losses on sale (Board & Day, 1989). So, in an efficient market, only the unexpected earnings provide new information because prices already reflect any expected level of earnings (Kothari, 2001; Board & Day, 1989). This led researchers to study the association between unexpected changes in earnings and unexpected returns⁸⁹.

Beaver (1968) presented a definition of the information content of earnings as follows.

"A firm's earnings report is said to have information content if it leads to a change in investors' assessments of the probability distribution of future return (or prices), such that there is a change in equilibrium value of the current market price" (P. 68).

Numerous studies have widely documented the information content of earnings in both event studies and association studies. Examples of events studies which documented the information content of earnings include Ball & Brown (1968), Beaver (1968), Foster (1977), and Ball & Kothari (1991). The two articles of Ball & Brown (1968) & Beaver (1968) represented together the founding landmarks for the whole field of market based accounting research studies (Strong, 1993).

Ball & Brown (1968) began the stream of market based accounting research by their seminal article on the relationship between stock returns and earnings. They examined⁹⁰ security return behavior surrounding earnings announcement and their study documented (i) a significant relation between the sign of unexpected earnings and the sign of associated stock price changes, and (ii) a significant relation between unexpected earnings changes and unexpected price changes.

⁸⁹ The standard approach for assessing the earnings return relation, the information content of earnings, is to examine the significance of the slope coefficient and the coefficient of determination, (R^2), the explanatory power, in the following linear ordinary least squares regression: $Y_{it} = a + b X_{it} / P_{t-1} + e_{it}$, where Y_{it} is stock price returns or abnormal return for time period t , X_{it} is a earnings forecast error scaled by the market value of equity of the start of period t (P_{t-1}). The previous regression model can be estimated cross-sectionally and (or) over time by using an event study or association method (See Collins & Kothari, 1989; Biddle et al., 1995).

⁹⁰ The main variables examined in this study were earnings per share and net income. The additional variables examined were cash flow, defined as operating income, and net income before nonrecurring items.

More specifically, Ball & Brown divided their sample into two portfolios: good news portfolio, and bad news portfolio, according to the sign of earnings forecast errors⁹¹, earnings innovations, where good news portfolio represented positive forecast errors and bad news portfolio represent negative forecast errors. Then, they compared the cumulative abnormal returns over the year for the two portfolios. They found that market reacted in the same direction as the earnings forecast errors, earnings innovations, so that if there were positive (negative) earnings forecast errors, the stock market prices changes increased (decreased) accordingly. For example, at the end of the annual earnings announcement month, the study reported an abnormal performance index (API)⁹² for net income (earnings per share) of 1.071 (1.073) and 0.907 (0.905) for good news portfolio and bad new portfolio respectively⁹³.

Brown (1994) summarised the major impact of Ball & Brown's (1968) study on the accounting literature since 1968 as follows.

- It was cast in the mould of a traditional experiment: hypothesis, data collection, data analysis, and conclusion.
- It expressed a view that ran counter to the critics of generally accounting accepted principles (GAAP).
- It was an early plea for empirical research.
- It emphasised the use of the data to test a belief.
- It adopted an information perspective.
- It contained the basic elements of a research design that became a model for future research.

⁹¹ Earnings forecast errors were measured by using (i) the random walk model for the earnings per share variable, and (ii) regression model, similar to the methodology of market model used to estimate abnormal return, for earnings per share variable and net income.

⁹² Abnormal performance index (API) represents the mean abnormal return for all firm/years on the level of each portfolio in which earnings forecast errors are of a particular sign.

⁹³ These results are according to (i) forecast errors which were estimated by using the regression model, and (ii) the end of the annual earnings announcement month. These results were robust when the mean of the abnormal return was computed for a wide window consisting of each of the 11 months prior to and the 6 months following to the month of earnings announcement. The abnormal performance index (API) for the portfolio of positive forecast errors rose continuously over the twelve months preceding the month of earnings announcement and the abnormal performance index (API) for the portfolio of negative forecast errors declined continuously over the twelve months preceding the month of earnings announcement.

- It was a particularly robust experiment, in the sense that it has been replicated for firms with different fiscal years, in different countries, and at different times.
- It gave rise to many papers in related areas.

In addition to Ball & Brown's (1968) study which examined the relation between unexpected earnings and mean abnormal returns, other studies (e.g., Watts & Zimmerman, 1986, chapter 3) (i) explored the relation between earnings announcements and the variance of abnormal return, (ii) used trading volume to assess the information content of earnings announcement and (iii) replicated and extended Ball and Brown's work using different methodologies and data relating to other than the U.S. countries (Board & Day, 1989).

Beaver (1968) related earnings information to share price volatility and trading volume in the weeks around earnings announcements. His study reported increased in return variability around the week of earnings announcements compared to the pre- and post non-announcement weeks.

Brown (1994) summarised the important advances in the study of Beaver (1968) as follows.

- Finessing the problem of finding an efficient surrogate for earnings expectations.
- Defining two more metrics, or indicators of market behavior, namely volume and volatility.
- Introduction of a narrower time window.
- Using more sensitive (weekly) data.
- Comparing experimental with control periods, in a self-matched experimental design.

Examples of association studies which documented the information content of earnings include, in the U.S. Ball & Brown (1968), Beaver et al. (1980), Beaver et al. (1987), and Collins & Kothari (1989), and in the U.K. Strong & Walker (1993), and Strong (1993).

Beaver & et al. (1980) used the cross-sectional regression approach to examine the relation between earnings and return over the period from 1958 to 1976. This study found a significant relation between the percentage changes in earnings per share and the percentage changes in stock prices where the earnings response coefficients was significant for all the nineteen years of the study. That association is consistent with annual earnings reflecting factors that affect stock prices such as current and expected cash flows (Watts & Zimmerman 1986 P. 83).

Collins & Kothari (1989) identified⁹⁴ several factors that affect the magnitude of the earnings response coefficient⁹⁵. Kothari (2001) mentioned several reasons for the relatively small magnitude of the earnings response coefficient compared to its predicted value⁹⁶. Earnings persistence, among these factors, and transitory earnings, among these reasons, constitute a significant part of the empirical work of this study⁹⁷.

With respect to earnings persistence, several studies have confirmed the information content for the high earnings persistence (e.g., Collins & Kothari, 1989; O'Hanlon et al., 1992; Donnelly & Walker, 1995).

O'Hanlon et al. (1992) defined the earnings persistence measure as the present value of a revision in the future earnings expectations occasioned by a unit surprise in current earnings. They argued that the idea behind earnings

⁹⁴In the study of Collins & Kothari (1989), temporal and cross-sectional factors have been identified as affecting the magnitude of the earnings response coefficient. The temporal variation in earnings response coefficient was found to be negatively correlated to the risk-free rate. The cross-sectional variation in earnings response coefficient was found to be positively correlated to earnings persistence and growth and negatively correlated to firm's systematic risk.

⁹⁵ The earnings response coefficient (ERC) is defined as the effect of a dollar of unexpected earnings on stock returns, and typically measured as a slope coefficient in the regression of abnormal stock returns on the appropriately scaled unexpected earnings (Cho & Jung, 1991). For a review article of the accounting literature on Earning Response Coefficient (ERC) see Cho & Jung (1991).

⁹⁶ Four main reasons were given to explain the low magnitudes of earnings response coefficients. First, prices lead earnings; second, inefficient capital markets; third, noise in earnings; and deficient GAAP, and fourth, transitory earnings. For details of these four reasons see Kothari (2001).

⁹⁷ In addition to examining the incremental information content of earnings, working capital from operations, and cash flow from operations, this study investigates the effect of extreme earnings on the incremental information content of cash flow from operations and the effect of extreme working capital from operations on the incremental information content of cash flow from operations. See chapter 5, section 5.4.3.

persistence is that using earnings surprise adjusted to reflect the extent to which the surprise is likely to persist, rather than the earnings surprise itself, leads to cross-sectional variation in the magnitude of market reaction to accounting earnings numbers. Brown (1994) defined the earnings persistence as the degree to which an earnings innovation in the current period persists and affects future earnings expectations.

Collins & Kothari (1989) is an example of a study of the relationship between earnings response coefficient and earnings persistence in the U.S. Collins & Kothari used time-series estimates of earnings persistence; and their empirical findings showed that the cross-sectional variation in earnings response coefficient (ERC) is positively correlated to earnings persistence. O'Hanlon et al. (1992) examined the issue of whether adjustments of earnings surprise to reflect cross-sectional variation in earnings persistence improve the strength of the association between stock market abnormal returns and unexpected earnings in the U.K. To estimate earnings persistence, they used a firm specific time-series model identified and estimated for each firm's real earnings per share (EPS) which characterises the earnings generating process. In addition, they allowed the earnings capitalisation rate to vary from firm to firm. Their findings supported the view that market reaction to earnings surprise depends on the extent to which the impact of unexpected earnings changes can be expected to persist.

Regarding transitory earnings, several studies have shown the limited information content of transitory earnings. The idea behind transitory earnings is that assuming that annual earnings follow a random walk⁹⁸ model while if these annual earnings contain transitory⁹⁹ components this may lead to a measurement error in unexpected earnings and thus the change in earnings may be a poor proxy for unexpected earnings. Hence, the slope coefficient on unexpected earnings will be biased toward zero (Ali & Zarowin, 1992 B).

As an attempt to improve the explanatory power and the magnitude of earnings response coefficients in the presence of transitory components in earnings, recent work on earnings return relation attempted to improve upon earlier research

⁹⁸ Random walk model is an ARIMA (0,1,0).

⁹⁹ For more details about the econometric consequence of transitory earnings see Kothari (2001)

efforts by adopting two developments. First, including both the change and the level of earnings in the earnings return relation (see for example, in the U.S., Easton & Harris, 1991; Ohlson and Shroff, 1992; Ali and Zarowin, 1992 A; Ali and Zarowin, 1992 B, and in the U.K., Strong & Walker, 1993). Second, controlling for the extremity of earnings by isolating the transitory earnings components apart from permanent components (e.g., Freeman & Tes, 1992; Ali and Zarowin, 1992 A). Several of these recent studies showed an improvement in the earnings returns regressions.

It seems from the previous discussion that the reasons for using level and change in earnings and distinguishing between permanent and transitory components of earnings are raised if earnings consist of a mixture of values of transitory and permanent components¹⁰⁰. The key is to recognise the concept of the transitory components in earnings or in which cases that these transitory components exist and the methods of measuring these transitory components for isolating them from the permanent components.

Cheng et al. (1996) gave the following concept for the transitory components in earnings.

"Earnings may contain transitory items with limited valuation implications. Examples of transitory items in earnings include current and long term accrual such as losses due to restructuring, current recognition (through asset sales) of previous periods' (or current period's) increases in market value, one time impact on income from change in accounting standards, and so on. Moreover, because compensation contracts and debt covenants are often based on reported accounting income, incentives exist for managers to introduce transitory elements in earnings" (Cheng et al., 1996, P. 177).

Kothari (2001) mentioned several reasons for the existence of transitory components in earnings. First, certain business activities, like asset sales, produce one-time gain and losses. Second, because of information asymmetry between managers, and outsiders and because of potential litigation, there is a demand for and supply of conservative accounting numbers. Third, managerial motivations rooted in agency theory might contribute to transitory gains and losses.

¹⁰⁰ In this study and following Cheng & Yang (2003) the terms moderate and permanent and the terms extreme and transitory are used interchangeably.

Scott (2003) presented the following example to explain the meaning and the effect of transitory and permanent components in earnings: if the current positive unexpected earnings are due to the successful introduction of a new product or vigorous cost-cutting by management, the earnings response coefficient should be higher than if these positive unexpected earnings are due to, for example, an unanticipated gain on disposal of plant and equipment. From this example, Scott argued that the reason for expectation higher of an earnings response coefficient (ERS) in the first case is that the increase in the revenue or cost saving will persist, whereas the expectation of a lower earnings response coefficient (ERS) in the second case exists because there is no reason for these unexpected earnings to recur.

There are several ways for measuring the transitory components in earnings. As shown earlier, Collins & Kothari (1989), O'Hanlon et al. (1992), and Donnelly & Walker (1995) used the time-series estimates to measure earnings persistence. Ali & Zarowin (1992 A) and Ou & Penman (1989) used earnings to price ratio to measure transitory components in earnings¹⁰¹. Freeman & Tse (1992) used the absolute change in earnings financial analysts forecast errors deflated by the beginning of the period price to isolate transitory components in earnings apart from permanent components. In general, Freeman & Tse (1992) showed that earnings response coefficient (ERC) is more sensitive to forecast error magnitude than to firm-specific average persistence. They concluded that measuring earnings permanence using the absolute change in earnings is better than the time-series estimates based upon that "investors may assign each earnings surprise a unique persistence measure that depends on the absolute magnitude of the surprise" (P. 187).

Regarding using earnings change and earnings level together as explanatory variables in earnings return relation, Easton & Harris (1991) demonstrated that both earnings changes and earnings levels have information content when included together in the earnings return relationship. Including both the change and the level of earnings to improve the association between earnings and return was considered by Ali & Zarowin (1992 A) in the U.S. They assumed that annual

¹⁰¹ For other methods to distinguish between transitory components and permanent components in earnings see Freeman & Tse (1992).

earnings follow an *IMA* (1, 1) process¹⁰², which permits earnings level variable to enter the earnings return relationship in addition to earnings change variable. They divided their sample into 10 groups ranked by beginning-of-period earnings-price ratios. Firms with positive earnings were divided into the first nine groups with an approximately equal number of firms per group whereas all firms with negative earnings are in group 10. The middle six groups are considered as those with predominantly permanent earnings, and firms in the other four groups are considered as those with predominantly transitory earnings. They found that the incremental explanatory power and increase in earnings response coefficient (ERC) for firms with predominantly permanent earnings from including the earnings level variable are small, as compared to a regression model with only earnings change as an explanatory variable. For the firms with predominantly transitory earnings, the incremental explanatory power and increase in earnings response coefficient (ERC) are much greater. These results support the idea that earnings levels capture transitory components in earnings and act as an additional proxy for unexpected earnings when the previous period's earnings are not purely permanent and suggested that measurement error in unexpected earnings has contributed to the low explanatory powers and low earnings response coefficients (ERCs) in previous research. Furthermore, these results point out that the more transitory in earnings components, the greater is the measurement error in the earnings change variable as a proxy for unexpected earnings, and the greater is the expected incremental explanatory and increase in earnings response coefficient (ERC) when the earnings level variable is added (Ali & Zarowin, 1992 A).

Similar results regarding the role of earnings level in earnings return relationship can be drawn from the study of Strong & Walker (1993) In the U.K., Strong & Walker showed that using both change and level of earnings lead to significant improvements in the explanatory power of the earnings return relationship.

¹⁰² *IMA* (1, 1) process is an *ARIMA* (0, 1, 1) where *IMA* is the integrated moving average and *ARIMA* is the autoregressive integrated moving average. *ARIMA* model is described by the following notation: (p,d,q) where p is the number of lagged values of the variable (the number of autoregressive parameters), d is the number of times X is differenced (the number of consecutive differences) and q is the number of lagged values of error term (the number of moving average parameters). If annual earnings follow *IMA* (1,1) process the annual earnings can be expressed as follows: $X_t = X_{t-1} + a_t - \theta a_{t-1}$, where X_t is the annual earnings, a_t is the earnings shock (unexpected earnings) in the period t and θ is the moving average parameter.

With respect to isolating the transitory components in earnings apart from permanent components, Freeman & Tse (1992) showed that earnings return relation is nonlinear and transitory earnings have lower persistence than permanent earnings. They documented a high marginal price response after controlling for transitory components in earnings financial analysts forecast errors.

3.4.3 The information content of cash flow and earnings¹⁰³

Lev & Ohlson (1982) in their review of market based accounting research (MBAR) stated that:

"Given the beliefs, particularly among practitioners, that cash flows reflect better than accrual earnings the econometric realities of a company's performance, it is surprising that so little research has been devoted to this issue" (P. 265).

Since 1986, the information content of cash flow has been an important research area in accounting. There currently exists an extensive body of research in this area (e.g., in the U.S., Ball & Brown, 1968; Beaver & Dukes, 1972; Beaver et al., 1982; Schaefer & Kenneley, 1986; Wilson, 1986 & 1987; Rayburn, 1986; Bowen et. al., 1987; Bernard & Stober, 1989; Livnat & Zarowin, 1990; Ali, 1994; Dechow, 1994; Cheng et al., 1996; Cheng et al., 1997; Pfeiffer et al., 1998, Pfeiffer & Elgers, 1999; Cheng & Yang, 2003; and in the U.K., Board & Day, 1989; Board et al., 1989; Ali & Pope, 1995; Garrod & Hadi, 1998; Green, 1999; Charitou et al., 2001).

The previous studies on information content of cash flow fall into two main areas. First, studies have been conducted to investigate the potential of cash flow to complement earnings in explaining security returns. Usually these studies are known as the incremental information content of cash flow and earnings. The incremental information content of cash flow has been investigated using either an association study methodology and can be considered an extension to the earnings return relation (e.g., in the U.S., Beaver et al., 1982; Schaefer & Kenneley, 1986; Rayburn, 1986; Bowen et. al., 1987; Livnat & Zarowin, 1990;

¹⁰³ The literature review on the information content of cash flow and earnings is presented in the next chapter.

Ali, 1994; Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang, 2003; and in the U.K., Board & Day, 1989; Board et al., 1989; Ali & Pope, 1995; Garrod & Hadi, 1998; Green, 1999; Charitou et al., 2001) or an event study methodology (e.g. Wilson, 1986 & 1987; Bernard & Stober, 1989).

The second set of studies has been conducted to investigate the superiority of either cash flow or earnings in explaining security returns. These studies are known as the relative information content of cash flow and earnings (e.g. Ball & Brown, 1968; Beaver & Dukes, 1972; Board & Day, 1989; Board et al., 1989; Dechow 1994; Ali & Pope, 1995).

Along the same lines as recent research on the earnings return relation, contemporaneous work on the incremental information content of cash flow and earnings¹⁰⁴ attempted to improve upon earlier research efforts by adopting the following two points¹⁰⁵ (i) using both the change and the level of earnings and cash flow for measuring their unexpected amounts (e.g., in the U.S. see Cheng et al., 1996; Cheng & Yang, 2003; and in the U.K., see Ali & Pope, 1995; Charitou et al., 2001), and (ii) decomposing cash flow and earnings into transitory components and permanent components (e.g. Ali, 1994; Cheng et al., 1996; Cheng & Yang, 2003; Charitou et al., 2001).

In his review of market-based accounting research, Kothari (2001) considered the information content of cash flow and earnings studies as a sub-area of research on the evaluation of alternative accounting performance measures. He argued that capital-markets studies assume that an accounting performance measure serves either (i) the managerial performance measure role to indicate the value added by the manager's efforts or actions in a period or (ii) the valuation information role to indicate the firm's economics income or the change in shareholder's wealth.

Recent work on evaluating accounting performance measures have turned to (Kothari, 2001) (i) examine the information content of the new performance measures that are required to be disclosed by the Financial Accounting Standard

¹⁰⁴ See contemporaneous research on incremental information content of cash flow and earnings, chapter 4, section 4.3.2.

¹⁰⁵ For the motivation of employing these two points see section 3.4.2 in this chapter.

Board (FASB) (e.g., comprehensive income compared to primary earnings per share), (ii) examine the relative and incremental information content of different measures advocated by compensation consultants such as Stern Stewart & Company against earnings (e.g., economics value added (EVA) compared to earnings and cash flow, see Biddle et al., 1997), and (iii) evaluate alternative measures used by real estate investment trusts (REIT) (e.g., funds from operations as a measure of operating performance of the REIT compared to net income, see Gore & Stott, 1998).

3.5 Summary

This chapter presented and discussed the usefulness of cash flow information related to decision-making relevance in two main areas. First, the usefulness of cash flow information for bankruptcy prediction. Second, the usefulness of cash flow data to predict itself. Moreover, this chapter showed the foundations of cash flow information and capital market studies as a preliminary step to the next chapter.

With respect to the usefulness of cash flow information in predicting bankruptcy, funds flow investment and financing components showed a greater role than cash flow from operations to predict bankruptcy. Also, the role of cash flow information could be maximised in predicting bankruptcy when financial failure is defined broadly.

Regarding the usefulness of cash flow data to predict future cash flow, the multivariate time series prediction models are superior to both multivariate cross-sectional regression models and common structure ARIMA models.

Finally, this chapter also presented the foundations of cash flow information and capital market studies. Studies on the information content of cash flow and accruals are considered an area within market-based accounting research (MBAR) and can be considered an extension to earnings return relationship studies. In order to improve the earnings return relationship, recent studies in this area explicitly employed some new innovations such as using the level and change of earnings and control for the extreme earnings. As with recent work on the earnings return relationship, contemporaneous work on information content

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of cash flow and earnings has employed the same innovations to show the potential role of cash flow data in explaining security returns, especially, when earnings are extreme. Prior studies on the incremental information content of cash flow and earnings are presented and discussed in the next chapter.

Chapter 4: Prior studies on the incremental information content of cash flow and earnings

4.1 Introduction

4.2 The classification of studies on the information content of cash flow and earnings

4.3 Literature review of prior studies on the incremental information content of cash flow and earnings

4.3.1 Early incremental information content studies of cash flow and earnings

4.3.1.1 Main U.S. studies

4.3.1.2 Main U.K. studies

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4.3.2 Contemporaneous research on incremental information content of cash flow and earnings

4.3.2.1 Main U.S. studies

4.3.2.2 Main U.K. studies

4.3.2.3 Main conclusions

4.4 Contributions of this study

4.5 Summary

Chapter 4: Prior studies on the incremental information content of cash flow and earnings

4.1 Introduction

Empirical work on the information content of cash flow and earnings can be classified into (i) relative information content studies, and (ii) incremental information content studies. The objective of this study is to examine the incremental information content of earnings, working capital from operations and cash flow from operations. The analysis is conducted in two separate stages¹⁰⁶. First, following recent U.S. work (e.g., Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang; 2003; among others) this study investigates the incremental information content of cash flow from operations and earnings and the effect of extreme earnings on the incremental information content of cash flow from operations. Second, the study assesses the generality of the findings of recent U.S. studies, as will be conducted in the first stage, by employing testable hypotheses to investigate the incremental information content of cash flow from operations and working capital from operations in separate empirical models to identify whether cash flow from operations and current accruals are valued differentially. This is followed by an examination of the effect of extreme working capital from operations on the incremental information content of cash flow from operations to assess whether extreme working capital from operations lead to incremental information content for cash flow from operations. The second stage is considered as an evaluation for the results of the first stage.

The starting point to achieve the above objectives is to review prior studies on the incremental information content of cash flow and earnings in order to develop the research hypotheses, the empirical models, and the methodology which will be employed to examine the incremental information content of cash flow from operations and earnings, followed by the incremental information content of cash flow from operations and working capital from operations.

The remainder of this chapter is organised as follows. Section 2 distinguishes between the relative and incremental information content of cash flow from

¹⁰⁶ For the rationale of conducting these two separate stages, see research problem and contributions of this study in chapter 1.

operations and earning including a brief review of relative information content of cash flow and earnings studies. Section 3 presents prior studies on incremental information content of cash flow and earnings classified into: (i) early work in this area and (ii) contemporaneous work. Section 4 provides an evaluation to recent research on incremental information content of cash flow and earnings in order to show the contributions of this study. Section 5 concludes the chapter.

4.2 The classification of studies on the information content of cash flow and earnings

The efficient market hypothesis states that the stock price reflects all publicly available information. As a consequence stock prices or stock returns are considered a measure of a firm's value or performance. In market based accounting research (MBAR), the significant relation between earnings (cash flow) and share returns reveals that earnings (cash flow) have information content. MBAR determines the information content of earnings (cash flow) by their use in setting stock prices

Brown (1994) explained the information perspective as follows

"The information perspective is the view that accounting earnings is a signal that is informative, for whatever reason. That perspective leads to the question, what are the properties of signals that are informative? They change investors' beliefs, and the changes are sufficient to change their behaviour. Forecast errors, being the unexpected or surprise component, are the informative part of the earnings signal. Changes in security prices are one observable measure of systematic changes in investors' beliefs" (P. 24).

Beaver (1968) presented the definition of the information content of earnings as follows.

"A firm's earnings report is said to have information content if it leads to a change in investors' assessments of the probability distribution of future return (or prices), such that there is a change in equilibrium value of the current market price" (P. 68).

It can be inferred from the above two definitions that a given accounting measure (cash flow or earnings) has information content when this measure lead to price revisions or to the extent that this measure provide information relevant to assessing the amount and timing of firm's future cash flow. The hypothesis on the information contained in earnings studies is that investors change their

assessment of share value when they observe earnings. In the same way, the hypothesis in the incremental information content studies of cash flow and earnings is that investors change their assessment of share value when they observe cash flow and earnings information.

There are two types of information content studies: (i) incremental information content and (ii) relative information content. Biddle et al. (1995) distinguished between them as follow.

“Incremental comparisons ask whether one accounting measure provides information content beyond that provided by another, and apply when one measure is viewed as given and an assessment is desired regarding the incremental contribution of another (e.g., a supplement disclosure). Relative comparisons ask which measures has greater information content, and apply when making mutually exclusive choices among alternatives, or when rankings by information content are desired (e.g., when comparing alternative disclosures.)” (Biddle et al., 1995, P. 1).

Incremental information content studies examine whether one measure adds more information content beyond (above) that contained in one other measure or another set of measures. Relative information content studies compare between the measures to determine which measures contain greater information content than others.

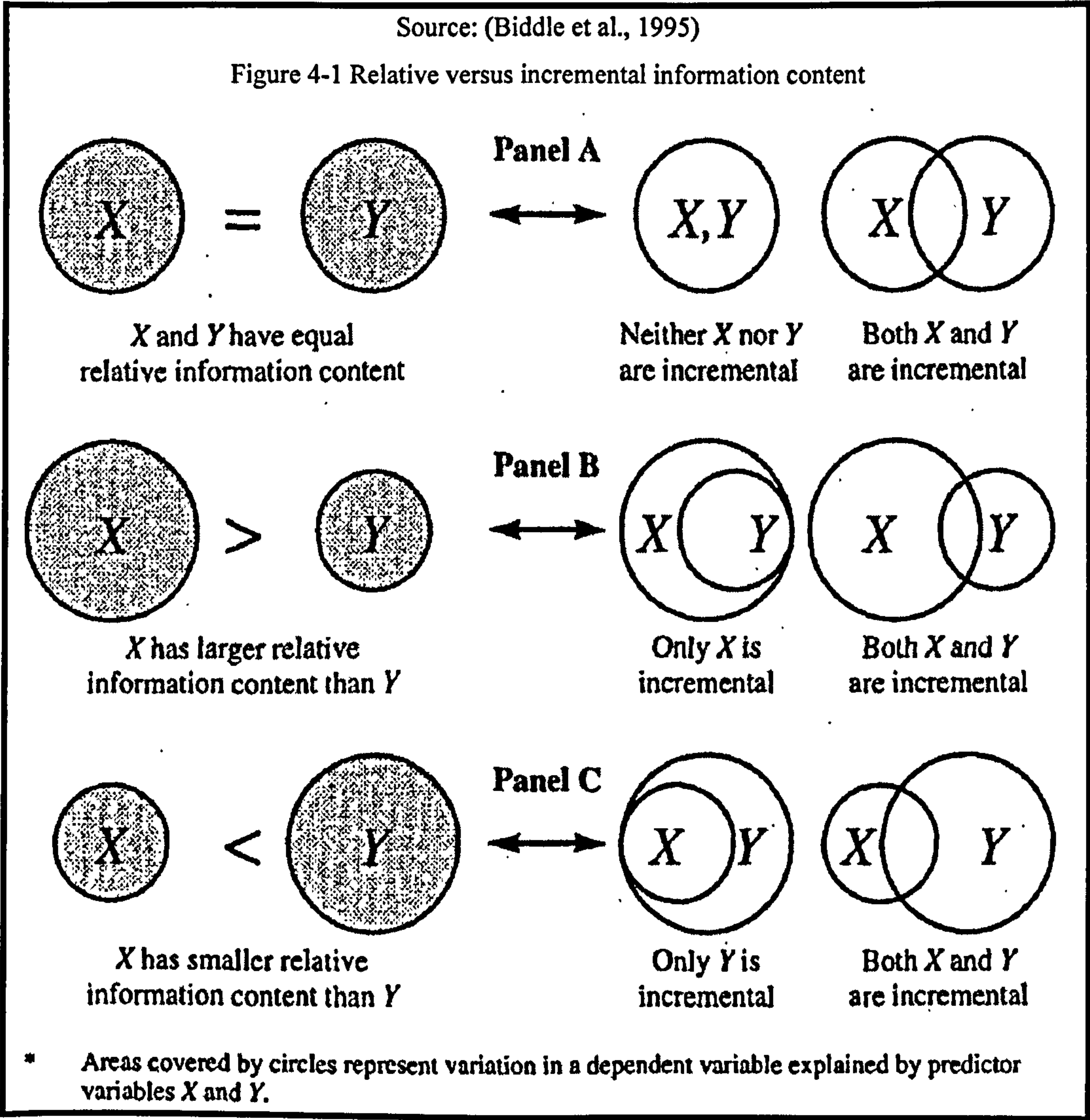
Questions of both incremental and relative information arise frequently in accounting; they address different research questions and require different tests for statistical significance¹⁰⁷ (Biddle et al., 1994). Examples of research has examined the incremental information content include (Biddle et al., 1995): (i) supplement accounting disclosures, and (ii) the incremental information content of financial statement components. Questions of relative information content are raised, for example, regarding: (i) whether accounting disclosures based on

¹⁰⁷ To assess the relative information content, Dechow (1994) proposed that the Vuong's (1989) test, used to test the difference between adjusted r-squares of the rival models and interpret a statistically higher r-square as an indication for higher relative information content, indicates which model better explains the dependent variable without assuming that the null hypothesis for either model is true. Also, Biddle et al. (1995) proposed their own statistical test for assessing the relative information content. This test compares favorably with Vuong's test based on that it can be employed in conjunction with White's correction for heteroskedastic errors. For more details about Vuong's (1989) test and Biddle's et al. test see Dechow (1994), Biddle et al. (1995) respectively.

For assessing the incremental information content see chapter 5 section 5.4.3. See also, Biddle et al. (1994 & 1995).

Foreign generally accounting accepted principles are more informative than those based on U.S. generally accounting accepted principles (GAAP), and (ii) when evaluating alternative performance (Biddle et al., 1995).

As depicted in Figure (4-1), the mapping between relative and incremental information content is not one-to-one. Each relative information content condition maps into two incremental outcome conditions (Biddle et al., 1995). On this basis, although relative information content studies rank the different performance measures, this ranking does not provide any indication of the incremental information content of these measures beyond each other (Biddle & Seow, 1993)¹⁰⁸.



¹⁰⁸ Source: Ali & Pope (1995).

In the light of previous discussion, there are two types of information content studies of cash flow and earnings, (i) relative information content studies of cash flow and earnings, and (ii) incremental information content studies of cash flow and earnings.

Relative information content studies of cash flow and earnings seek to investigate the superiority of either cash flow or earnings in explaining security returns. Examples of relative information content studies of cash flow and earnings include (in the U.S., Ball & Brown, 1968; Beaver & Dukes, 1972; Dechow, 1994; Gore & Stott, 1998; and in the U.K., Board & Day, 1989; Board et al., 1989; Ali & Pope, 1995; Clubb, 1995; Charitou, 1997; other studies include Kinnunen & Niskanen, 1993; Plenborg, 1998; Bartov et al., 2001; Haw et al., 2001). The empirical question in relative information content studies of cash flow and earnings is which measure, cash flow or earnings, provides greater information content?

Incremental information content studies of cash flow and earnings seek to investigate the potential of cash flow to complement earnings in explaining security returns¹⁰⁹. Examples of incremental information content studies of cash flow and earnings include (in the U.S., Patell & Kaplan, 1977; Beaver et al., 1982; Schaefer & Kenneley, 1986; Rayburn, 1986; Bowen et al., 1987; Wilson, 1986 & 1987; Bernard & Stober, 1989; Livnat & Zarowin, 1990; Ali, 1994; Cheng et al., 1996; Cheng et al., 1997; Pfeiffer et al., 1998; Pfeiffer & Elgers, 1999; Cheng & Yang, 2003; in the U.K., Board & Day, 1989; Board et al., 1989; Ali & Pope, 1994; Ali & Pope, 1995; Clubb, 1995; Barrak, 1995; Madani, 1995; Charitou, 1997; Mcleay et al., 1997; Garrod & Hadi, 1998; Charitou & Clubb, 1999; Green, 1999; Charitou et al., 2001; other studies include Bartov et al., 2001; Haw et al., 2001). The empirical question in incremental information content studies of cash flow and earnings is whether cash flow has information content beyond earnings and vice versa.

Since the focus of the current study is on the incremental information content of earnings, working capital from operations and cash flow from operations, a brief

¹⁰⁹ For empirical models and statistical test used to assess the incremental information content of cash flow and earnings see chapter 5, section 5.4.3.

review of a number of studies that addressed the relative information content of cash flow and earnings is presented.

The two major classical studies on the relative information content of cash flow and earnings were considered to be by Ball & Brown (1968) and Beaver & Dukes (1972).

As a supplemental work to their primary work on the information content of net income and earnings, Ball & Brown (1968)¹¹⁰ examined the information content of cash flow as an additional definition of income. Cash flow was approximated by operating income which was defined as net income before depreciation and amortization. They reported an abnormal performance index (API)¹¹¹ at the end of the annual earnings announcement month for net income (cash flow) of 1.071 (1.070) and 0.907 (0.917) for good news portfolio and bad news portfolio respectively¹¹². These results showed that cash flow was not as successful in predicting the signs of the mean abnormal stock returns as net income.

Beaver & Dukes (1972) compared the informational content of three measures: earnings as currently reported (called deferral earnings), earnings before deferral of income taxes (called nondeferral earnings), and cash flow. They defined cash flow by simply adding back depreciation, depletion, and amortization to earnings before deferral of income taxes. Beaver & Dukes employed a similar methodology to Ball & Brown's (1968) methodology. Their findings supported Ball & Brown's (1968) results where they found that unexpected earnings had a higher association with unexpected returns than cash flow.

Recently, Dechow (1994) investigated the role of accrual to improve earnings' ability to measure firm performance. She considered earnings and cash flow as competing performance measures and her objective was to determine which measure, earnings or cash flow, is a best summary for evaluating firm performance. Her results supported that earnings are a better measure of firm

¹¹⁰ For more details about this study see chapter 3 section, 3.4.2

¹¹¹ Abnormal performance index (API) represents the mean abnormal return for all firm/years on the level of each portfolio in which earnings forecast errors are of a particular sign.

¹¹² Good news portfolio and bad news portfolio were constructed according to the sign of net income (cash flow) forecast errors where good news portfolio represented positive forecast errors and bad news portfolio represent negative forecast errors. Net income (cash flow) forecast errors were measured by regression model, similar to the methodology of the market model used to estimate abnormal returns.

performance than cash flow. She showed the conditions that make earnings relatively more superior to cash flows regarding a firm's performance. These conditions were: (i) the shorter the performance measurement interval, (ii) the greater the volatility of the firm's working capital requirement and investments and financing activities, and (iii) the longer the firm's operating cycle. Under these circumstances, cash flow is predicted to suffer more severely from timing and matching problems that reduce their ability to reflect firm performance.

Gore & Stott (1998) investigated the relative information content of net income (NI) and funds from operations (FFO) to evaluate which summary measure (NI) or (FFO) is more informative of the Real Estate Investment Trust (REIT). A fund from operation (FFO) is calculated as net income before depreciation expense and realised gains or losses from the sale of real estate¹¹³. They used net income (NI) per share and funds from operations per share which equals: (net income per share – Depreciation expense per share – gain or loss of real estate investment per share) as independent variables and the annual market adjusted returns as a dependent variable. The results showed that FFO is a relatively more informative summary measure of firm performance than NI. However, the results did not support the rejection of the null hypothesis of no difference between NI and FFO.

In the U.K., Board & Day (1989)¹¹⁴ examined the relative information content of three performance measures: net income, funds flow, and cash flow from operations. Their results showed that (i) earnings have information content in 9 out of 16 years, (ii) funds flow have information content in 7 out of 16 years, and (iii) cash flow from operations have information content in 1 out of 16 years. These results show that earnings are a more relevant basis for decision making than cash flow measures.

Board et al. (1989)¹¹⁵ explored the relative information content of the same three measures of the Board & Day's (1989) study. They used two sets of data,

¹¹³ The exclusion of realized gains and losses from the sale of real Estate is based on two reasons. (i) a portion of the realized gain or loss according to GAAP is attributable to accumulated depreciation. So to achieve consistency with exclusion of depreciation these gains or losses should be excluded also. (ii) Because REITs are designed to be long-term investors in real Estate, gains or losses from the sale of real Estate are not considered to be recurring in nature.

¹¹⁴ For more details about Board & Day's (1989) study see studies on incremental information content later in this chapter.

¹¹⁵ For more details about this study see studies on incremental information content later in this chapter.

covering the U.K and U.S. markets. Their results for the U.S. sample showed that (i) earnings have information content in 18 out of 18 years, (ii) funds flow have information content in 17 out of 18 years, and (iii) cash flow from operations have information content in 5 out of 18 years. Their results for the U.K. sample showed that (i) earnings have information content in 9 out of 16 years, (ii) funds flow have information content in 7 out of 16 years, and (iii) cash flow from operations have information content in 1 out of 16 years. These results show that earnings are a more relevant basis for decision making than cash flow measures. Again, these results show that earnings dominate cash flow measures in explaining security returns.

Another example from the U.K. market of relative information content studies is Ali & Pope's (1995)¹¹⁶. They examined the relative information content of three performance measures: earnings, funds flow, and cash flow. Three innovations which have been used in earnings return relation were employed. First: using the current level of earnings, together with the change in earnings as a proxy for its unexpected components. Second: using time-varying parameters in the earnings-return relation instead of constraining the parameters to be constant across years. Third: using a specific non-linear regression for the relation between returns and earnings instead of a linear relation. The objective of using these three innovations was to improve the explanatory power of the models which examine the relative information content of cash flow and earnings. To assess the relative information content of earnings, funds flow, and cash flow, Ali & Pope estimated four models. Each model included one of the previous three innovations whereas the fourth model included all these three innovations. The results showed that the explanatory power (adjusted R^2) of earnings, funds flow, and cash flow improves gradually from model 1 to model 4. They reported an adjusted (R^2) of earnings with 15.23%, 18.53%, 17.06%, and 20.84% for models 1, 2, 3, and 4 respectively. The results for funds flow were 9.92%, 12.41%, 12.07 % and 15.77% and for cash flow were 4.06%, 3.95%, 4.68%, and 5.25 %. These results

¹¹⁶ For more details about Ali & Pope's (1995) study, see studies on incremental information content later in this chapter.

indicate that earnings have the higher relative information content than funds flow and cash flow in all four models.

Based on U.K. Data, Charitou (1997) replicated partially Dechow's (1994) study. He found that earnings is shown to be the dominant explanatory variable in the marketplace and cash flow plays a more important role in the marketplace in the following situations: (i) the smaller the absolute magnitude of aggregate accruals, (ii) the longer the measurement interval, and (iii) the shorter the firm's operating cycle.

In the emerging capital market, in China, Haw et al. (2001) investigated the relative information content of earnings and cash flow from operations. Their results showed that earnings have greater relative information content than cash flow. Earnings explained 5.8% of the variation of annual returns whereas operating cash flow explained only 0.3%.

Bartov et al. (2001) explored the relative information content of cash flow and earnings for equity valuation within five countries: the United States, the United Kingdom, Canada, Germany, and Japan. They found that the superiority of earnings over cash flow is not universal. It depends on the national regime and attendant institutional factors. More specifically, their results indicated that (i) in the three Anglo-Saxon countries, where capital is traditionally raised in public markets and reporting rules are unencumbered by taxation requirements, earnings are more important than cash flow in equity valuation, and (ii) conversely, in the two other non-Anglo-Saxon countries, where capital is traditionally raised from the private sector, earnings is not superior to cash flow in equity valuation.

In summary, the studies of relative information content of cash flow and earnings concluded that earnings were more highly associated with stock market prices changes than cash flow. In other words, earnings are superior to cash flow in explaining security returns.

4.3 Literature review of prior studies on the incremental information content of cash flow and earnings

Given the vast number of empirical studies on incremental information content of cash flow and earnings, the following review represents the main U.S. and U.K. studies in this area. The main focus is on studies which have employed the return analysis approach. The review has been divided into two main groups. First: early incremental information content studies of cash flow and earnings. Then: contemporaneous incremental information content of cash flow and earnings.

4.3.1 Early incremental information content studies of cash flow and earnings

The review of early incremental information content studies of cash flow and earnings begins with the main U.S. and U.K. studies and then the main conclusions in respect of these early studies.

4.3.1.1 Main U.S. studies

(1) Patell & Kaplan (1977)¹¹⁷

Patell & Kaplan's (1977) study is considered the first study which addressed the issue of incremental information content of cash flow and earnings. They examined the incremental information content of cash flow defined as working capital from operations¹¹⁸. Abnormal returns were defined using the market model and percentage changes in working capital from operations were used as a proxy for the unexpected cash flow. They measured the relation between abnormal returns and unexpected working capital from operations after dividing their sample into portfolios based on the sign and the magnitude of percentage changes in earnings to control for the earnings effect. Patell & Kaplan were unable to find information content of working capital from operations beyond accrual earnings. However, it may be these results, which did not support the

¹¹⁷ Source: Bowen et al. (1987), Rayburn (1986), and Neill et al. (1991).

¹¹⁸Source: Watts & Zimmerman (1986, Chapter three): Patell and Kaplan used the *Compustat* variable "total funds from operations" as a proxy for cash flow from operations. That variable is defined as net income after extraordinary items plus deferred taxes and depreciation minus unremitted earnings of unconsolidated industries plus "other adjustments".

information content of working capital from operations, were due to the high correlation between earnings and working capital from operation which makes it difficult to isolate the incremental effect of earnings apart from working capital from operations.

(2) Beaver et al. (1982)

Beaver et al. (1982) addressed the incremental association of cash flow and earnings with security returns. They defined cash flow by simply adding back depreciation, depletion, and amortization to net income. Their sample size was 313 U.S. firms, over the period from 1977 to 1978. Beaver et al. estimated cross-sectional regressions and pooled regression¹¹⁹ with annual raw returns as dependent variable and percentage changes in earnings and cash flow as independent variables. The results obtained from cross-sectional regression did not report incremental information content for cash flow beyond earnings. However, the pooled regression of observation showed some incremental explanatory power for cash flow relative to earnings. They conclude that "The performance of cash flow variable is an open issue" (P.34).

(3) Rayburn (1986)

Rayburn (1986) investigated whether accounting accruals adjustments have incremental information content beyond cash flow from operations. In other words, she addressed the question whether the components of earnings have incremental information content beyond each other.

She decomposed earnings in two ways. First: (i) cash flow from operations, and (ii) total accruals. Her cash flow measure was constructed from income

¹¹⁹ Beaver et al. (1972) employed the two-stage regression analysis. They used this two-stage procedure due to the difficulty of interpretation of significance levels of individual regression coefficients in the presence of highly collinear independent variables, in this case cash flow and earnings. For making inference by using the two-stage procedure regarding the incremental information content for a given variable, for example cash flow, beyond other variable, for example earnings, two stage regression analysis should be conducted. First: conduct a regression of cash flow on earnings. Second: conduct a regression of return on both earnings and the residuals from the first regression. Then examine the statistical significant of the slope coefficient on the coefficient of the residual from the second regression. This two-stage procedure is equivalent to an F test on adding cash flow to the regression of return on earnings (see Bowen et al. 1987).

statements and comparative balance sheet data¹²⁰ and was defined as accounting earnings before extraordinary items adjusted by total accruals. Total accruals were defined as the difference between earnings and cash flow from operations and were included depreciation, the change in deferred taxes, and the change in working capital other than cash, short-term investments, and current maturities of long term liabilities. Second: (i) cash flow from operation, (ii) current accrual, and (iii) non-current accrual. Current accrual was defined as the change in working capital other than cash, short-term investments, and current maturities of long term liabilities and non-current accrual was defined as depreciation and change in deferred tax.

Based on a sample size of 175 U.S. firms with a December year end for the period from 1963 to 1982, Rayburn estimated two cross-section regression models for each sample year. The first model was employed to investigate the incremental information content of (i) cash flow from operations, and (ii) total accrual. The second model was employed to investigate the incremental information content of (i) cash flow from operations, (ii) change in working capital other than cash, short-term investments, and current maturities of long-term liabilities, (iii) depreciation, and (v) change in deferred tax. In each model, the independent variables were the unexpected portion of the respective cash flow and accruals variables whereas the dependent variable was the market model abnormal return over a yearly holding period.

The unexpected amounts of the independent variables were calculated as the difference between the actual and the expected value of the respective cash flow and accrual variables deflated by the market value of equity at the beginning of year t to reduce heteroscedasticity. Two expectation models have been used to estimate the expected value. First: a firm specific time series model based on a regression of each independent variable on lagged values of all independent variables except the value for the year being estimated. Second: a random walk model.

¹²⁰ Rayburn (1986) did not use statement of change in financial position to estimate cash flow from operations because this statement became available in 1971 and her study started from years before this date (her study started in 1963).

Rayburn's first model results showed that (i) based on the random walk expectation model, both cash flow from operations and total accruals have incremental content beyond each other. The study reported significant annual regression coefficients for unexpected cash flow from operations (unexpected aggregate accruals) of 18 (16) years out of 20 years. (ii) Based on time series expectation model, the results were not as strong as the results of the random walk model. The study reported a significant annual regression coefficients for unexpected cash flows from operations (unexpected aggregate accruals) of 10 (8) years out of 20 years.

Rayburn's second model results showed that cash flow from operations and change in working capital other than cash, short-term investments, and current maturities of long term liabilities have greater information content than depreciation and change in deferred tax.

Based on these findings, Rayburn concluded that: "operating cash flow, total accruals and current accruals are consistent with the information set used to value equity securities" (P. 132).

(4) Bowen et al. (1987)

Based on a sample size of 98 U.S. firms over the period from 1972 to 1981, Bowen et al. (1987) investigated two opposite cases. First: whether cash flow information has incremental information beyond earnings. Second: whether earnings information have incremental information beyond cash flow. They defined four measures; two of them regarding accrual data, and the other two regarding cash flow data. Their two accrual measures were: (i) net income before extraordinary items and discontinued operations, and (ii) working capital from operations. Working capital from operations was defined as net income before extraordinary items and discontinued operations plus adjustments¹²¹ for elements of net income before extraordinary items and discontinued operations not affecting working capital. The other two cash flow measures were (i) cash flow from operations, and (ii) cash flows after investment. In contrast to previous research, data from the statement of changes in financial position were used to

¹²¹ These adjustments commonly include the removal of depreciation and amortization but also may include adjustments for gains and losses on asset sales, gains and losses on investments accounted for by the equity method, amortization of bond premiums, and deferred taxes.

calculate the two cash flow variables. Cash flow from operations was defined as working capital from operations minus change in non-cash current assets plus the change in current liabilities from operation; and cash flows after investment was defined as cash flow from operation adjusted for the period's cash flow from investment activities.

Bowen et al. employed a multiple regression technique for measuring the relationship between the unexpected returns used as a dependent variable and the unexpected amounts of the respective measure from the previous four measures as independent variables. Unexpected returns were measured by the standardised market model abnormal return accumulated over an annual event window ending three month after the fiscal year end. The unexpected amounts of the independent variables were defined as the percentage of the first difference of each measure. However, unexpected cash flow from operations was defined as the current year's cash flow from operations minus the preceding year's working capital from operation, deflated by the absolute value of the preceding year's working capital from operations¹²². They constructed several multiple regression models; the first model included the four measures, the full model, whereas the other models included only a subset of the available independent variables. To assess the incremental information content of accrual measures and cash flow measures, the sum of squared errors of the full model was compared to that obtained from the other four models. This methodology of F-test which examines the incremental information content of accrual measures as a group and cash flow measures as a group allows assessing the incremental information content in the presence of the high collinearity between the independent variables (Neill et al., 1991).

They used two methods to estimate their models: (i) cross-sectional for all firms and for all years in the sample (pooled cross-sectional), and (ii) year by year method (cross sectional by year). The results of the pooled regression reported that: (i) both cash flow measures (both individually and as a group) have incremental content information beyond accrual measures, (ii) accrual measures

¹²² Bowen et al used working capital from operations to estimate unexpected cash flow from operations because they found in their (1986) study that cash flow from operations was best predicted by last period's working capital from operations than either last period's cash flow from operations or earnings.

as a group have incremental content information beyond cash flow measures, (iii) individually only earnings, not working capital from operations, have incremental information content beyond cash flow measures. The results of the annual cross-sectional regression reported: (i) mixed results regarding the incremental information content of cash flow measures, and (ii) consistent results with the pooled regression regarding the incremental information content of accrual measures.

Bowen et al. concluded that "cash flow information is consistent with the information impounded in security prices and also has incremental explanatory power beyond that contained in accrual flows alone" (P. 746).

(5) Wilson (1986 & 1987)¹²³

Wilson (1987) examined the market reaction to a firm's disclosures of cash flow information. In contrast to previous association studies, his study employed an event study methodology¹²⁴ by focusing on a short event window and using daily abnormal returns near the release of the annual report to assess the incremental information content of cash flow. Based upon that, earnings are usually announced in *the wall street journal* several weeks before the release of the annual report (the date the annual reports arrive at SEC); Wilson considered earnings announcement and the release of the annual report two separate events. In this way, the novel aspect of Wilson work was that he exploited the fact that accrual earnings and cash flow are announced at different points in time and this fact achieves a requirement of the event study methodology (Brown, 1994, Chapter 11).

Specifically, Wilson investigated whether the accrual component and funds from operations component of earnings have incremental information content beyond earnings itself. He used two ways to define the components of earnings. First, earnings equal working capital from operations (funds from operations

¹²³ Wilson's (1986) article in the *Accounting Review* precedes Wilson's (1987) article in the *Journal of Accounting Research*. But, according to Wilson his article in 1986 is an extension to the results of his article in 1987. Thus Wilson's (1987) article is presented first then Wilson's (1986) article.

¹²⁴ For the concept and the difference between the association study and the event study methodology see chapter 3, section 3.4.1

component) plus non-current accruals¹²⁵. Second, earnings equal cash flows from operations (funds from operations component) plus total accruals¹²⁶.

To control for the early release of funds from operations (cash flow from operations or working capital from operations), only firms which do not officially release funds from operations information before they issue their annual report were included in the sample¹²⁷. The sample size consisted of 322 firm-year observations over two years; the period from 1981-1982. Wilson used two techniques for assessing the incremental information content of the funds from operations component: (i) a pooled cross-sectional regression model, and (ii) portfolio approach. In the pooled regression, the study examined the relation between market model abnormal return averaged over three and nine days, a short-event window (short interval), which were centered at the date the release of the annual report, and forecast errors of the funds from operations component for each firm year for the fourth quarter of year 1981 and 1982. In the portfolio approach, firms were allocated into three portfolios ranked by the magnitude of the forecast errors of the funds from operations component for each firm year for the fourth quarter of year 1981 and 1982; then the difference between the mean market model predictions errors, computed over nine days centered at the date the release of the annual report of these three portfolios were compared.

In respect with the forecast errors of the funds from operations component, Wilson chose to exploit the information in quarterly disclosures, which resulted in an innovative cross-sectional prediction models approach to modeling expectations (Neill et al., 1991). He adopted a very general approach for estimating the forecast errors of the funds from operations component (Brown, 1994, Chapter 11) defining them as the residuals from a cross-sectional

¹²⁵ Working capital from operations was defined as earnings after extraordinary items plus noncurrent accruals. Non-current accrual = discontinued operations + deferred taxes + depreciations and amortization + unremitted earnings of unconsolidated subsidiaries + adjustments for other non-current accruals used to determine earnings.

¹²⁶ Cash flow from operations was defined as working capital from operations plus current accruals. Current accrual = (i.e., the net changes in all of the working capital accounts except for changes in cash, marketable securities and short term debt).

¹²⁷ Also, there was at least eight days interval between earnings announcement of the fourth quarter and resale of the annual report that carries funds from operations and accrual components of further quarter of earnings.

regression of fourth-quarter funds from operations component on a vector of information available at the earnings announcement. This vector consisted of, 15 independent variables, fourth-quarter earnings and revenues for the current year and four lagged variables for: (i) revenues (ii) non-current accruals, (iii) current accruals, and (iv) cash flow from operations. These lagged variables were from third quarter and the first half of the current year and the fourth quarter of the previous year. Annual capital expenditures are also included. All these variables were deflated by the book value of total assets.

The results of pooled regression showed that the cash flow from operations coefficient was positive and significantly different from zero whereas the working capital from operations was not significant. The results of the portfolio approach showed that when funds were defined as cash flow from operations there was a significant difference in the mean market model predictions errors across portfolios. There was, however, not a significant difference in the mean market model predictions errors across portfolios when funds were defined as working capital from operations¹²⁸.

Wilson concluded that "total accruals and cash flow from operations taken together, have incremental information content beyond earnings and that there is a positive association between this component information and stock return" (P. 319).

In summary, Wilson (1987) found that a fund from operations component has incremental information content when this component was defined as cash flow from operations and not as working capital from operations.

Wilson (1986) investigated the incremental information content of accruals beyond funds from operations for the fourth quarter of the year 1981 and 1982. The study employed the same data, variables, and expectations models used in his 1987 study. Once earnings are known then funds from operations are disclosed, this means that immediate knowledge of accruals as well. Therefore, given the methodology of Wilson (1987), it was impossible to assess the incremental information content of the accruals beyond funds from operations (Neill et al., 1991). In this study, Wilson employed two returns intervals at both

¹²⁸ These results were robust to the exclusion of outliers defined as an observation that was more than four standard deviations from its cross-sectional mean.

the earnings and funds announcement dates to address the question of whether the accrual components of earnings have incremental information content beyond the funds component. In other words, he used daily data to compare market reactions around the release of annual report to reactions at the preceding wall street journal earnings announcement date. By restricting the parameters in this two-return model, Wilson was able to assess the incremental information content of accruals over funds and for the incremental information content of funds over earnings. Both market model abnormal return averaged over nine days (which were centered at the date the release of the annual report) and market model abnormal return averaged over nine days (which were centered at earnings announcement) were aggregated and regressed on forecast errors of (i) cash flow from operations and accruals component, and (ii) working capital from operations and non-current accruals component.

The results showed that cash flow from operations and current accruals components have incremental information content beyond earnings and that the current accruals component of earnings has incremental information content beyond cash component. On the other hand, there is evidence that either non-current accruals do not have incremental information content beyond working capital from operations or that they are known prior to the earnings announcement.

Together Wilson (1987 & 1986) confirmed that cash flow from operations and current accruals are valued differently and hence the decomposition of working capital from operations into current accruals and cash flow from operations has information content beyond earnings. However, Bernard & Stober (1989) argued that "there is mixed evidence on the extent to which this "preference" for cash flows over current accruals holds across other research designs" (p. 627).

(6) Bernard & Stober (1989)

Bernard & Stober (1989) assessed the generality of Wilson's (1987) study to identify whether Wilson's results are specific to the time period that he examined. They employed similar methodology as Wilson's (1987) study, but they

examined all four quarters over the period from 1977 to 1984 (32 quarters). The sample size consisted of 2401 firm-year observations.

Their findings¹²⁹ were consistent with Wilson's two fourth quarters of year 1981 and 1982; however, Bernard and Stober (1989) showed that Wilson's results are not obtained beyond his sample period or economic conditions. In other words, they found that Wilson's (1987) results could not be generalized beyond the two quarters examined in Wilson (1987) where the coefficient from regressing market model abnormal return averaged over nine days, a short-event window (short interval), which were centered at the date the release of the annual report, on forecast errors of cash flow from operations was negative and statistically insignificant.

As two possible explanations for these findings, Bernard & Stober concluded that

" either (1) the security price reactions to the release of cash flow and accrual data in financial statements are too highly contextual to be modelled parsimoniously, or (2) important uncertainties about the contents of detailed financial statements are resolved prior to their public release" (P. 624).

(7) Livnat & Zarowin (1990)

Livnat & Zarowin (1990) examined the incremental information content of the components of the three sub-titles of the American accounting standard of cash flow statement required by Financial Accounting Standard (*SFAS No. 95*) (FASB 1987). They examined whether the components of cash flow from operation, cash flow from investing activities, and cash flow from financing activities have differential associations with stock returns, and whether these associations are consistent with theory.

With at least 345¹³⁰ U.S. firms, with a December year end, in each of the years covering the period from 1974 to 1986 and pre-*SFAS No. 95* income statement, balance sheet, and statement of change in financial position data, Five components of cash flow from operations have been estimated: (1) cash collection from customers, (2) cash payments to suppliers, employees, etc., (3)

¹²⁹ In an additional analysis Bernard & Stober examined (i) different economics regimes, and (ii) further decomposition of current accruals components. No one of these alternatives alter the results.

¹³⁰ In this study, 281 firms were available for all the years of the study. The maximum sample size was 434 firms for one year from all the year of the study.

cash payments to tax authorities, (4) net interest paid, and (5) other operating cash flow. Five components of cash flow from investing activities have been estimated: (1) cash used for new investments in property, plant, and equipment, (2) cash used for acquisitions of new businesses, (3) cash used to acquire additional interest from minority shareholders, (4) cash invested in new unconsolidated subsidiaries, and (5) cash obtained through the retirement of property, plant, and equipment. Four components of cash flow from financing activities have been estimated: (1) cash received in net debt issuance, (2) cash received in net-preferred-stock issuance, (3) cash received in net common-stock issuance, and (4) cash dividends paid.

Livnat & Zarowin regressed the annual cumulative market model abnormal return¹³¹ on the change in each of the previously mentioned cash flow components, as well as accruals¹³², from the prior year (assuming a random-walk-generating process for these components) deflated by the market value of equity at the beginning of the year to minimise heteroskedasticity in the data. To assess the incremental information content of these components, they estimated the previous relation separately for each of the sample years (cross sectional by year) and then they computed the average coefficients over the 13 annual cross-sectional regressions and used cross-temporal *t*-statistics¹³³.

The results¹³⁴ showed that: first, cash flow from operations: (i) the individual components of cash flow from operations were strongly associated with security returns and had the signs expected by theory except tax payments; (ii) the individual components of cash flow from operations were differentially associated with security returns. Second, cash flow from investing activities: (i) the individual components of cash flow from investing activities were generally insignificant, and (ii) the individual components of cash flow from investing

¹³¹ Livnat & Zarowin used two abnormal return windows. First, market model abnormal returns were accumulated over the contemporaneous year with the earnings report. Second, market model abnormal returns were accumulated over an annual event window ending three month after the fiscal year end. Their results were very similar across these two abnormal return windows.

¹³² Accruals were defined as the difference between earnings and cash flow from operations.

¹³³ Cross-temporal *t*-statistics were computed as the mean annual coefficient divided by the standard error of the mean coefficient over the 13 annual cross-sectional regressions.

¹³⁴ The results of this study were robust under different condition such as: (i) using the fiscal year as the return window, (ii) exclusion of the outliers, (iii) using the raw return instead of abnormal return as a dependent variable, and (v) employing alternative forecasting models.

activities were not associated differentially with security returns. Third, cash flow from financing activities: (i) the individual components of cash flow from financing activities were as predicted by theory but they did not exhibit the same significance levels as the coefficients of cash flow from operations, however, the coefficients of cash received in net debt issuance and cash dividends paid were significant, and (ii) the individual components of cash flow from financing activities were differentially associated with security returns.

In an additional test, they showed that the unadjusted R^2 was 0.248 for the model which was included all the components of cash flow from operation, cash flow from investing activities, cash flow from financing activities, and accruals in comparison with unadjusted R^2 of 0.081 for the model which included earnings only.

Livnat & Zarowin concluded that

"financial statements contain more information than just 'the bottom-line' earnings figure; i.e., financing and operating cash flows capture additional information about valuation-relevant economics events, beyond that which is captured by earnings alone" (P. 42).

4.3.1.2 Main U.K. studies

(1) Board & Day (1989)

This study can be considered the first study in the U.K. which examined the incremental information content of three performance measures: net income, funds flow, and cash flow from operations. Funds flow was defined as net income plus depreciation and deferred taxation and cash flow from operations was defined as funds flow plus change in stock and work in progress. All these three measures are deflated by opening net book value of shareholders funds. The sample size was 39 British manufacturing firms over the period from 1962 to 1977. Board & Day estimated cross-sectional regression¹³⁵ to examine two variables at a time. The dependent variable was market model abnormal return

¹³⁵ They used two stage procedure to examine the incremental information content of a given measure beyond the other. This two stage procedure is equivalent to bivariate regression which examines the incremental information content of two measures by including them in one regression model and then examines the slope coefficient of each measure. This point was discussed in Christie et al. (1984).

accumulated over a yearly holding period ending two months after the fiscal year end. The independent variables were the unexpected value of each measure. Unexpected value was computed as the difference between the actual and expected value, of each measure, which has been obtained from the random walk model.

Their findings showed that (i) earnings have incremental information content in 5 years and (9 years) out of 16 years beyond funds flow and (cash flow from operations) respectively, (ii) funds flow have incremental information content in 2 years and (7 years) out of 16 years beyond earnings and (cash flow from operations) respectively, and (iii) cash flow from operation has incremental information content in 2 years and (3 years) out of 16 years beyond earnings and (funds flow) respectively.

These results supported the view that earnings have incremental information content beyond funds flow and cash flow but these results did not support that funds flow and cash flow from operations have incremental information content beyond earnings. These results reveal that earnings are more relevant basis for decision making than cash flow measures.

(2) Board et al. (1989)

Board et al. (1989) investigated the same three measures of the Board & Day's (1989) study for the same period, the same sample size using the same methodology with two main differences between the two studies. First: Board et al. (1989) defined cash flow from operations as funds flow adjusted by current accrual (basically change in non-cash working capital). Second: they used additional data set for a sample of 193 U.S. firms over the period from 1965 to 1982.

Their findings for the U.S. sample showed that (i) earnings have incremental information content in 14 years and (18 years) out of 18 years beyond funds flow and (cash flow from operations) respectively, (ii) funds flow have incremental information content in 17 years out of 18 years beyond cash flow from operations, but never exhibited incremental information content in all 18 years beyond earnings, and (iii) cash flow from operations never exhibited incremental information content in all 18 years beyond earnings or funds flows.

Their finding for the U.K. sample showed that (i) earnings have incremental information content in 5 years and (9 years) out of 16 years beyond funds flow and (cash flow from operations) respectively, (ii) funds flow have incremental information content in 1 year and (7 years) out of 16 years beyond earnings and cash flow from operations respectively, and (iii) cash flow from operations never exhibited incremental information content in all 16 years beyond earnings or funds flows.

Board et al. concluded that "Strong evidence is presented to the effect that stock market prices behave as if the market perceives accounting income to be a more relevant measure of firm performance than either cash flow or funds flow" (P.1).

4.3.1.3 Main conclusions

It was well documented that there was a contemporaneous relation between returns and earnings. The literature then went to the next logical step and decomposed earnings into its components. The reporting of earnings components, i.e., operating cash flow, current accruals, and non-current accruals, rests on the premise that such disaggregated disclosures are informative to investors (Pfeiffer & Elgers, 1999). Regarding early studies on incremental information content of cash flow and earnings, the previous review presented seven studies; five for the U.S. and two for the U.K. In the U.S., the review of the early work on incremental information of cash flow and earnings included: (1) Patell & Kaplan (1977), (2) Beaver et al. (1982), (3) Rayburn (1986), (4) Bowen et al. (1987), (5) Wilson (1986 & 1987), (6) Bernard & Stober (1989), and (7) Livnat & Zarowin (1990). In the U.K., the review of the early work on incremental information of cash flow and earnings included: (1) Board & Day (1989), and (2) Board et al. (1989).

The following points regarding the early incremental information content of cash flow studies can be noted.

- The results of Patell & Kaplan (1977) and Beaver et al. (1982) studies which did not document incremental information content of cash flow beyond earnings may be attributed in part to the crude measure of cash flow, cash flow calculation in both these two studies was defined as earnings prior to deductions for depreciation, depletion, and amortization,

which have used as a proxy for cash flow from operation. It should, however, be noted that (Watts & Zimmerman, 1986, Chapter three): (i) using cash flow from operation instead of this crude measure of cash flow may increase the operating cash flow's association with unexpected returns, given that there is some evidence that managers manipulate these accruals to affect their compensation, and (ii) using total net cash flow instead of operating cash flow may help to increase the association with unexpected returns based on that investment cash flow may have information content.

- The other studies refined the methodology of testing the incremental information content of cash flow from operations and earnings as, for example, in Bowen et al. (1987) and employed a proper measure for cash flow from operations as, for example, in Bowen et al. (1987) and Rayburn (1986). Some studies employed daily holding period such as Wilson (1986 & 1987) and Bernard & Stober (1989) to examine the market reaction to a firm's disclosures of cash flow information.
- Working capital components (operating cash flow and current accruals) have higher incremental information content than non-current accruals (Rayburn, 1986; and Wilson 1986 & 1987). Working capital from operations contains most, if not all, of the value-relevant information present in accounting income (Wilson 1986 & 1987).
- In an additional analysis of the results of Rayburn (1986) and Bowen et al. (1987), Jennings (1990) showed that the results of Bowen et al. (1987) study supported the differential valuations of cash flow from operations and current accruals. However, these results contradicted the results of Rayburn (1986).
- Wilson (1986 & 1987) showed that cash flow from operations and current accruals have different associations with security returns. However, these results contradicted the results of Bernard & Stober (1989).

- The two U.K. studies considered by Board & Day (1989) and by Board et al. (1989) suggested that cash flow from operations do not provide incremental information content beyond earnings.

As a summary the results of early incremental information content of earnings components showed that both cash flow from operations and accruals add to the informativeness of earnings. However "there is only weak and inconsistent evidence that accrual components of income are valued differently from cash flow component by investors" (Jennings, 1990, P.931).

Table 4-1 provides a summary for early studies reviewed up to this point on the incremental information content of cash flow and accruals.

Table 4-1 Main early studies on incremental information content of cash flow and accruals

Authors & Year	Period examined	Window	Items examined	Main conclusion
1. Patell & Kaplan (1977) (U.S.)	1972: 1975 ¹³⁶	12 months	Working capital from operations.	Working capital from operations did not have incremental information content beyond earnings.
2. Beaver et al. (1982) (U.S.)	1977: 1978	12 months	Earnings prior to deductions for depreciation, depletion, and amortization.	The results obtained from cross-sectional regression did not support that cash flow, according to its definition in this study, have incremental information content beyond earnings. However, the results obtained from the pooled regression showed weak evidence that cash flow has incremental information content beyond earnings.
3. Rayburn (1986) (U.S.)	1963: 1982	12 months	(i) Cash flow from operations and total accruals. (ii) Cash flow from operations, current accrual, and non-current accrual.	(i) Cash flow and total accrual have incremental information content beyond each other. (ii) Cash flow from operation and current accruals have more incremental information content than non-current accruals.
4. Bowen et al. (1987) (U.S.)	1972: 1981	12 months	Accrual measures: (i) earnings, and (ii) working capital from operation. Cash flow measures: (i) cash flow from operations, and (ii) cash flow after investment.	(i) Both cash flow measures have incremental information content beyond that contained in accrual measures. (ii) Earnings have incremental information content beyond cash flow measures. (iii) Working capital from operations did not have incremental information content beyond cash flow measures.

¹³⁶ Source: Neill et al (1991).

5. Wilson (1987 & 1986) (U.S.)	1981:1982	9 days	(i) Cash flow from operations, total accruals, and current accruals. (ii) Working capital from operations, non-current accruals	Cash flow from operations and current accruals are valued differently and hence the decomposition of working capital from operations into current accruals and cash flow from operations has information content beyond earnings.
6. Bernard & Stober (1989) (U.S.)	1977:1984	9 days	(i) Cash flow from operations, and total accruals. (ii) Working capital from operations, non-current accruals	Wilson's results are not obtained beyond his sample period or economic conditions.
7. Livnat & Zarowin (1990) (U.S.)	1974: 1986	12 months	The components of: (i) cash flow from operations, (ii) cash flow from investing activities, and (iii) cash flow from financing activities.	The individual components of cash flow from operations and from financing activities have incremental information content, whereas the individual components of cash flow from investing activities do not.
8. Board & Day (1989) (U.K.)	1962: 1977	12 months	(1) Funds flow (net income plus depreciation and deferred taxation) and (2) cash flow (funds flow plus change in stock and work in progress).	The results did not support that funds flow and cash flow from operation have incremental information content beyond earnings.
9. Board et al. (1989) (U.K.)	1965: 1982 for U.S. Sample. 1962: 1977 for U.K. Sample.	12 months	The same measures of the Board & Day's (1989) study. But cash flow from operations was defined as funds flow adjusted by current accrual.	The same results obtained from the Board & Day's (1989) study.

4.3.2 Contemporaneous research on incremental information content of cash flow and earnings¹³⁷

The review of contemporaneous¹³⁸ incremental information content studies of cash flow and earnings begins with the main U.S. and U.K. studies and then the main conclusions in respect to these studies

4.3.2.1 Main U.S. studies

(1) Ali (1994)

Ali (1994) can be considered the first study which addressed the effect of the permanent and transitory components of earnings, working capital from operations, and cash flow from operations upon their role in explaining the variation in security returns. The study examined the incremental information content of three measures: (1) net income before extraordinary items and discontinued operations, (2) working capital from operations, and (3) cash flow from operations¹³⁹. In the analysis, Ali conditioned the incremental information content of unexpected earnings, working capital from operations, and cash flow from operations on their magnitude with respect to price. He argued that large changes in earnings, working capital from operations, and cash flows from operations are not expected to persist and thus have reduced implications for returns.

The sample size of this study was 8820 U.S. firm-years with December year end covering the period from 1974 to 1988. Ali estimated two multiple regression models. The dependent variable was the annual stock raw return ending three months after the fiscal year end. The two models have been estimated on a year

¹³⁷ Most contemporaneous studies on incremental information content of cash flow and earnings in this section used the level and change in cash flow and earnings as a proxy for their unexpected components in the regression model when assessing their incremental information content. For the motivation of using the change and the level of earnings in earnings return relation, See chapter 3, section 3.4.2. Also, see chapter 5, section 5.4.2. Also, for assessing the statistical significance when using the level and change of the variable as a proxy for its unexpected components in the regression model see chapter 5, section 5.4.3.

¹³⁸ In this study and following Cheng & Yang (2003) the terms moderate and permanent and the terms extreme and transitory are used interchangeably. For more details of these terms and its implications for market based accounting research (MBAR) studies, see chapter 3, section 3.4.2.

¹³⁹ Earnings, working capital from operations, and cash flow from operations were defined similarly to those used in the study by Bowen et al. (1987).

by year basis¹⁴⁰ and the average coefficients over the 15 annual cross-sectional regressions have been computed and then cross-temporal *t*-statistics¹⁴¹ has been used to assess the incremental information content of, earnings, working capital from operations, and cash flow from operations.

In the first model, the independent variables defined by the first difference (the change from the prior year) in each respective measure for the three measures: (i) earnings, (ii) working capital from operations, and (iii) cash flow from operations deflated by the beginning-of- the fiscal year market value of equity. The results of the first model showed that both earnings and working capital from operations have incremental information content while cash flow from operations does not. (The coefficient for change in earnings and working capital from operations were significant and for change in cash flow from operations was not).

To examine the effect of permanent and transitory components of earnings, working capital from operations, and cash flow from operations on their own incremental information content, Ali estimated the following nonlinear regression model¹⁴² that allows the marginal price response to the unexpected component in each of the three measures to decline with the absolute value of that component:

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} D_{it} \times \Delta E_{it} + \alpha_{3t} \Delta WC_{it} + \alpha_{4t} D_{it} \times \Delta WC_{it} + \alpha_{5t} \Delta CF_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \varepsilon_{it}$$

Where:

R_{it} is the annual market returns, ΔE_{it} is the change in earnings, ΔWC_{it} is the change in working capital from operations, and ΔCF_{it} is the change in cash flow

¹⁴⁰ Also, Ali estimated the two models by cross-sectional and time series regression (pooled regression) but their inference were built upon the cross-temporal *t*-statistics test to avoid the potential problem of the cross sectional correlation in the residuals. However, the pooled regression results led to the same inferences as those based on yearly regressions. In the pooled regression, the dependent variable was annual market adjusted returns ending three months after the fiscal year end. The annual market adjusted returns was defined as the annual stock raw returns ending three months after the fiscal year end net of annual stock returns on market index ending three months after the fiscal year end.

¹⁴¹ Cross-temporal *t*-statistics were computed as the mean annual coefficients divided by the standard error of the mean coefficients over the 15 annual cross-sectional regressions.

¹⁴² In this model, Ali extended the Freeman and Tse (1992) analysis by allowing for nonlinear relations between abnormal returns and each of three performance measures: (i) net income, (ii) working capital from operations, and (iii) cash flow from operations.

from operations; for firm i in year t . Earnings, working capital from operations and cash flow from operations were deflated by the market value of equity at the beginning of year t .

In this nonlinear model, Ali divided the sample for each year into two groups; a low change and high change group based on whether the absolute value of their earnings changes, deflated by the market value of equity at the beginning of year t , lies above or below the yearly median. Firms falling below the median are classified as low change group and firms falling above the median as high change group. $D_{it} = 1$ when earnings belongs to the high-change group and $D_{it} = 0$ when earnings do not. The same procedure to classify firm-years into high-and low magnitude groups of working capital from operations and cash flow from operations was followed¹⁴³.

The coefficient α_{1t} represents the incremental information content of earnings of the low changes in earnings group, while the sum of the coefficients ($\alpha_{1t} + \alpha_{2t}$) represents the incremental information content of earnings of the high changes in earnings group.

The coefficient α_{3t} represents the incremental information content of working capital from operations of the low changes in working capital from operations group, while the sum of the coefficients ($\alpha_{3t} + \alpha_{4t}$) represents the incremental information content of working capital from operations of the high changes in working capital from operations group.

The coefficient α_{5t} represents the incremental information content of cash flow from operations of the low changes in cash flow from operations group, while the sum of the coefficients ($\alpha_{5t} + \alpha_{6t}$) represents the incremental information content of cash flow from operations of the high changes in cash flow from operations group.

¹⁴³ In this study, Ali examined the first-order correlations for both the low change group and high change group for the three measures examined. The study showed that (i) low group of earnings and working capital are consistent with random walk where the mean correlation of 15 years was positive and significant, and (ii) high group of earnings and working capital are consistent with mean reverting where the mean correlation of 15 years was negative and significant. For cash flow the results exhibited significant levels of mean reversion for both groups, and the level of mean reversions for the high change group is significantly higher. These results documented that the persistence of net income, working capital, and cash flow declines as the absolute value of changes in these measures increase.

The results showed that both earnings and working capital from operations have incremental information content in both groups (high and low), where α_{1t} , $(\alpha_{1t} + \alpha_{2t})$, α_{3t} , and $(\alpha_{3t} + \alpha_{4t})$ were positive and significant. Cash flow have incremental information content only in low cash flow change group, where α_{5t} was positive and significant, and $(\alpha_{5t} + \alpha_{6t})$ was not significant¹⁴⁴.

Also, the results indicated that the coefficients α_{2t} , α_{4t} , and α_{6t} were significant and negative, which suggest that the marginal price response to the unexpected components for the high-change (magnitude) group is significantly smaller than that for the low-change (magnitude) group for the three variables examined.

Ali concluded that "the power of tests of incremental information content of some of the other non-earnings data could be increased by allowing the security price responses to the unexpected components of the data to vary with the absolute value of the components" (P. 71).

(2) Cheng et al. (1996)

Cheng et al. (1996) investigated whether the incremental information content of cash flow from operations increases when earnings are transitory. They measured transitory items using earnings change scaled by beginning-of-period price and the earnings-to-price ratio. They conditioned the incremental information content of cash flow and earnings on earnings permanence. In other words, they expected that "transitory elements with limited valuation implications reduce earnings implications for security returns and elevate the importance of other measures such as cash flow from operations" (P. 177).

Based on sample size¹⁴⁵ of 1479 U.S. firms over the period from 1989 to 1992 which produce a sample of 5120 firm year observations, Cheng et al. estimated three multiple regression models and used the market model abnormal return accumulated over a yearly holding period ending three month after the fiscal year end as a dependent variable. To assess the incremental information content of

¹⁴⁴ These results were the same after re-estimating the nonlinear model with excluding the outliers which were defined as the absolute value of change in earnings, working capital from operation, or cash flows from operations which exceeded 1.

¹⁴⁵ The sample selection was not restricted to any industry or fiscal year-end; only was restricted to firms with no change in fiscal year-end.

cash flow and earnings, they estimated their models separately for each of the sample years (cross sectional by year) and they computed the average coefficients over the 4 annual cross-sectional regressions and then they used cross-temporal t -statistics. Cross-temporal t -statistics were computed as the mean annual coefficients divided by the standard error of the mean coefficients over the 4 annual cross-sectional regressions¹⁴⁶.

In the first model, the independent variables were defined as the change in the cash flow from operations¹⁴⁷ and earnings variables from the prior year, scaled by the beginning-of-year market value of equity. In the second model, they employed four independent variables which were the level and the change in the cash flow from operations as a proxy for its unexpected component and the level and the change in earnings as a proxy for its unexpected component¹⁴⁸. All these variables were scaled by the beginning-of-year market value of equity. The results of both first and second model documented incremental information content for cash flow and earnings beyond each other¹⁴⁹.

As an extension to the second model, the third model of Cheng et al. addressed the issue of the effect of earnings extremity on the incremental information content of cash flow. Their third model was set up as follows.

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \varepsilon_{it}$$

¹⁴⁶ Also, they estimated the three models by cross-sectional and time series regression (pooled regression) but their inference were built upon the cross-temporal t -statistics test to avoid the potential problem of the cross sectional correlation in the residuals. However, in most cases the results of pooled regression led to the same results of the cross-temporal t -statistics.

¹⁴⁷ This study employed actual numbers of cash flow as reported on the firm's statement of cash flows.

¹⁴⁸ For assessing the incremental information content when using the level and change of the variable as a proxy for its unexpected components in the regression model see chapter 5, section 5.4.3.

¹⁴⁹ This study was one of the first studies that documented incremental information content for cash flow from operations over earnings by using the change, and the level and change in cash flow and earnings as a proxy for their unexpected amounts. Also, this study can be considered as one of the first studies which used the level and the change of cash flow and earnings for measuring their unexpected amounts.

Where:

R_{it} is market model abnormal return, ΔE_{it} (E_{it}) is the change (level) in earnings and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations; for firm i in year t . Earnings and cash flow are deflated by the market value of equity at the beginning of year t .

In this model, they divided their sample for each year into two groups: permanent earnings and transitory earnings based on whether the absolute value of their earnings changes lie above or below the yearly median. Firms falling below the median are classified as permanent and firms falling above the median as transitory. $D_{it} = 0$ for permanent firms and $D_{it} = 1$ for transitory firms. As another method for measuring earning extremity, they divided their sample for each year into two groups: permanent earnings, and transitory earnings. The ratios of earnings to market value of equity at the end of year t are used to determine the two groups. All firms in each year are divided into nine groups depending upon the magnitude of these ratios with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratios. The middle six groups are classified as permanent and the other four groups are classified as transitory. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms.

Where:

The coefficients $(\alpha_1 + \alpha_3)$ and $(\alpha_2 + \alpha_4)$ represented estimates of the response coefficients of unexpected components of earnings and cash flow respectively, when earnings are predominantly permanent. In the same way, the coefficients $(\alpha_5 + \alpha_7)$ and $(\alpha_6 + \alpha_8)$ represented estimates of the response coefficients of unexpected components of earnings and cash flow respectively, for firms with predominantly transitory earnings.

The results showed that the sum of coefficients $(\alpha_1 + \alpha_3)$ was positive and significant which confirms the incremental explanatory power of earnings of predominantly permanent earnings. The sum of coefficients $(\alpha_2 + \alpha_4)$ was positive and significant which suggests that cash flow from operations also has incremental information content when earnings are permanent. However, this coefficient was insignificant when earnings to price ratio was used as a proxy for measuring earnings extremity. The sum of coefficients $(\alpha_5 + \alpha_7)$ was negative

and significant which is consistent with a smaller impact from transitory earnings on abnormal returns. The sum of coefficients ($\alpha_6 + \alpha_8$) was positive and significant which is consistent with the cash flow from operations variable having a greater impact on abnormal returns in the presence of large transitory in earnings.

Cheng et al. concluded that "the incremental information content of cash flow from operations is found to increase with decreases in the permanence of earnings" (P. 180).

(3) Pfeiffer et al. (1998)

Pfeiffer et al. (1998) examined the incremental information content of funds-based earnings components: (i) cash flow from operations, (ii) current accruals, and (iii) non-current accruals. They evaluated whether inferences about the incremental information content of earnings components are sensitive to whether component expectations come from a random-walk model or from a model that incorporates the historical auto- and cross-correlation structure in the components. The variables examined were: (i) earnings, (ii) working capital from operation, and (iii) cash flow from operations; all these three variables were defined similarly to Ali's (1994) study in order to facilitate comparisons to the results of that study and were defined as the per share values scaled by share price at the beginning of the fiscal year.

The sample size of this study was 22,253 U.S. firm-years with a December year end covering the period from 1981 to 1996. They estimated two multiple regression models (the same two models estimated by Ali (1994): (i) a simple random walk model; and (ii) a nonlinear model that allows parameter shifts for firm-years having extreme changes in the variables¹⁵⁰. The dependent variable was the size-adjusted return; defined as the difference between the realized return on each firm's stock for the 12 months ending three months after the fiscal year end and the mean return for all sample firms in the same size decile (size was defined on the basis of the market value of equity at the beginning of each fiscal year end). The two models have been estimated on a year by year basis and the average coefficients over the 16 annual cross-sectional regressions have been

¹⁵⁰ For more details about these two models, see Ali's (1994) study earlier in this chapter.

computed and then cross-temporal t -statistics¹⁵¹ have been used to assess the incremental information content of the three variables examined. In each model, the independent variables were the unexpected portions of each of the three variables.

The unexpected amounts of the independent variables were calculated as the difference between the actual and the expected value of the respective of each of the three variables examined. Two expectation models have been used to estimate the expected value. First: a random walk model; similar to Ali (1994). Second: the expected values of each variable were estimated based on measures of historical auto- and cross-correlations via regressions of each variable on the first lagged values of the three variables.

In respect with using random walk model for estimating the unexpected components, replication of Ali's (1994) study, they reported the same results of Ali's (1994) study¹⁵².

On the other hand, when the predictions of the variables examined are based on historical auto-and cross-correlations, the results of a simple linear model showed significant incremental valuation of operating cash flow over current accruals. Moreover, the results of the piecewise-linear model, Ali's (1994) nonlinear model, indicated that operating cash flow is incrementally valued for extreme as well as for moderate measures of unexpected cash flow. Also, the adjusted R^2 was higher for both models in comparison with the same two models using the random walk to estimate the unexpected components of the variables. This suggests that predictions of funds-based earnings components that are based on historical auto- and cross-correlation among the components are better representations of investors' expectations than the random-walk model.

Their explanation of these findings is that Ali's (1994) inability to detect valuation differences with a simple linear model, or to detect differences for extreme operating cash flow with a piecewise-linear model, is due to measurement error in the random-walk proxy for market expectations.

¹⁵¹ Cross-temporal t -statistics was computed as the mean annual coefficients divided by the standard error of the mean coefficients over the 16 annual cross-sectional regressions.

¹⁵² See Ali's (1994) study earlier in this chapter.

In summary, this study documented higher valuations of cash flow from operations relative to current accruals, when market expectations are represented using the dependency-based predictions rather than a random walk model¹⁵³.

(4) Pfeiffer & Elgers (1999)

Pfeiffer & Elgers (1999) argued that

"Delayed impounding of the valuation implications of earnings components implies that the valuation results in earlier studies may be confounded in at least two respects. First, the one-year interval conventionally used in assessing value coefficients may be too short to capture the market's complete adjustment to the differing valuation implications of earnings components. Second, returns conventionally used in assessing valuation coefficients are contaminated by the market's delayed adjustment to prior years' levels of the earnings components" (P. 240).

They examined the securities market's differential pricing of funds-based earnings components: (i) cash flow from operations, (ii) current accruals, and (iii) non-current accruals. Current accruals were defined as change in accounts receivable plus change in inventory plus change in other current assets minus change in accounts payable minus change in tax payable minus change in other current liabilities. Cash flow from operations was defined as working capital from operations¹⁵⁴ less current accruals. Non-current accruals were defined as earnings before extraordinary items and discontinued operations minus current accruals minus cash flow from operations. These variables were defined as the per share values scaled by share price at the beginning of the fiscal year.

Based on a sample size of 8,869¹⁵⁵ U.S. firm-years with a December year end over the period from 1981 to 1992, Pfeiffer & Elgers estimated three multiple regression models and used the size-adjusted return; defined similarly to the study of Pfeiffer et al. (1998), as a dependent variable. To assess the securities market's differential pricing of funds-based earnings components, they estimated

¹⁵³ This study also showed that proxies for market expectations of the components that are based on measures of historical serial and cross-dependencies are substantially more accurate than random-walk proxies.

¹⁵⁴ Working capital from operations equals the sum of income before extraordinary items, equity in net loss (earnings) of unconsolidated subsidiaries, extraordinary items and discontinued operations, depreciation and amortization, deferred income tax expense, gains and losses from sale or disposal of assets, and other funds from operations.

¹⁵⁵ Observations having returns or scaled funds-based earnings components that exceed 1 in absolute value were defined as outliers and deleted from the sample.

their models separately for each of the sample years (cross sectional by year) and they computed the average coefficients over the 12 annual cross-sectional regressions and then they tested whether cross-temporal t -statistics of the various coefficients of funds-based earnings components are the same.

Their first model was the conventional model that related the contemporary annual abnormal returns to changes in earnings components. They found that both cash flow and current accruals have significantly higher valuation coefficients than non-current accruals. However, no statistically significant difference in the valuation of operating cash flow and current accruals.

The second model was employed to address the issue of that funds-based earnings components are consistent with mean reverting. In this model, they related the contemporary annual abnormal returns to the unexpected components of the funds-based earnings components measured by the level and the first lag of each component. The results showed statistically significant differential valuations among the three coefficients of all three earnings components. They explained these results as follows: the inability to document a higher valuation for cash flow over current accruals in the first model, the conventional model, which employed the random-walk proxy for market expectations, is mainly due to the measurement error in specifying the market's expectations of the earnings components.

The third model was employed to control for the market's lagged response to each component of funds-based earnings components. This model was similar to the second model with two main modifications. First, returns are accumulated over the contemporaneous year and the subsequent four years in order to capture the market's lagged response to year t 's earnings components. Second, three additional lags of the earnings components are included as additional independent variables to control for the lagged response of the dependent variable to the earnings components reported in earlier years. The results documented statistically significant differential valuations of operating cash flow over both current accruals and non-current accruals and for current accruals over non-current accruals. The magnitude of the difference in the valuation coefficients of cash flow over current accruals was higher than reported in the

second model. Regarding the results of the third model, Pfeiffer & Elgers argued that "the specification of the third model is more appropriate for investigating the differential valuation of earnings components than the specifications of the second model" (P.246).

(5) Cheng & Yang (2003)¹⁵⁶

Ali (1994) tested the incremental information content of cash flow in the presence of its extremity and his study showed that the transitory cash flow is less informative than permanent cash flow. In other words, he found that the market puts more weight on permanent cash flow than on transitory cash flow. He did not control for the effect of earnings extremity¹⁵⁷. Cheng et al. (1996) examined the effect of earnings extremity on the incremental information content of cash flow from operations and earnings and their study showed that market places higher weight on cash flow when earnings are transitory than when earnings are permanent. They did not control for the extremity of cash flow itself¹⁵⁸.

Cheng & Yang (2003) investigated two main issues. First, the effect of the extremity of earnings on the incremental information content of cash flow from operations¹⁵⁹ and they controlled for the extremity of cash flow from operations itself. They saw that the incremental information content of cash flow depends not only on the persistence (transitory) of earnings but on both: (i) the persistence (transitory) of earnings, and (ii) the persistence (transitory) of cash flow.

Second, the effect of the extremity of cash flow from operations on the incremental information content of earnings¹⁶⁰ and also they controlled for the extremity of earnings itself. They saw that the incremental information content of earnings depends not only on the persistence (or transitory) of cash flow but on

¹⁵⁶ In this study Cheng & Yang used the term extreme as a surrogate for a term transitory and a term moderate as a surrogate for the term permanent. In the same way, in the explanation of this study these terms have been used interchangeably.

¹⁵⁷ In other words, Ali (1994) did not examine the effect of extreme earnings on the incremental information content of cash flow from operations.

¹⁵⁸ In other words, Cheng et al. (1996) did not isolate extreme cash flow apart from moderate ones when they examine the effect of extreme earnings on the incremental information content of cash flow and earnings.

¹⁵⁹ Cheng & Yang (2003) called the effect of earnings extremity on the incremental information content of cash flow the supplementary role of cash flow.

¹⁶⁰ Cheng & Yang (2003) called the effect of cash flow extremity on the incremental information content of earnings the supplementary role of earnings.

both: (i) the persistence (or transitory) of cash flow, (ii) the persistence (or transitory) of earnings.

Cheng & Yang (2003) argued that "the value relevance for cash flow and earnings decreases when they are extreme and transitory, and increases when the other competing measure is transitory and extreme". (P. 75)

In summary, they saw that even if earnings are extreme the incremental information content of cash flow from operations exists only for moderate cash flow and not for extreme cash flow. Also, they indicated that even if cash flow is extreme the incremental information content of earnings exists only for moderate earnings and not for extreme earnings.

Based on a sample size¹⁶¹ of 25993 U.S. firm year observations over the period from 1989 to 1997, Cheng & Yang estimated several regression models, in all their models they employed the annual marked adjusted returns, defined as the difference between the raw returns and value-weighted market returns and are accumulated over the 12-month period, beginning on the fourth month of each firm's fiscal year, as a dependent variable. To assess the incremental information content of cash flow and earnings, they estimated their models separately for each of the sample years (cross sectional by year) and they computed the average coefficients over the 9 annual cross-sectional regressions and then they used cross-temporal *t*-statistics¹⁶².

Before addressing the issue of the extremity, they estimated two regression models; change model and change and level combined model. In the change model, the independent variables were defined as the change in the cash flow from operations¹⁶³ and earnings variables from the prior year, scaled by the beginning-of-year market value of equity. In the level and change combined model, they employed four independent variables which were the level and the

¹⁶¹ the sample selection was not restricted to any industry or fiscal year-end; only was restricted to firms with no change in fiscal year-end.

¹⁶² Cross-temporal *t*-statistics were computed as the mean annual coefficient divided by the standard error of the mean coefficient over the 9 annual cross-sectional regressions. Also, they estimated their models by cross-sectional and time series regression (pooled regression) but their inference were built upon the cross-temporal *t*-statistics test to avoid the potential problem of the cross sectional correlation in the residuals. However, in most cases the results of pooled regression were consistent with the results of the cross-temporal *t*-statistics.

¹⁶³ This study employed actual numbers of cash flow as reported on the firm's statement of cash flows.

change in the cash flow from operations as a proxy for its unexpected component and the level and the change in earnings as a proxy for its unexpected component¹⁶⁴. All these variables were scaled by the beginning-of-year market value of equity. The results of these two models supported the incremental information content for cash flow and earnings beyond each other¹⁶⁵.

To assess the effect of the earnings extremity on the incremental information content of cash flow from operations and earnings, they estimated the following model¹⁶⁶ (the same model of Cheng et al., 1996).

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \varepsilon_{it}$$

Their results were the same as the study of Cheng et al. (1996) mentioned earlier in this chapter.

As an extension to the study of Cheng et al. (1996), they controlled for the extremity of cash flow from operations itself when assessing the effect of earnings extremity on incremental information content of cash flow and earnings. To control for the extremity of cash flow, the whole sample of the study was divided into two sub-samples, moderate cash flow and extreme cash flow, as follows.

(1) The first sub-sample represented moderate cash flow from operations. The ratios of cash flow to market value of equity at the end of year t are used to determine this sub sample. All firms in each year are divided into nine groups depending upon the magnitude of these ratios with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratios. The middle six groups are classified as moderate and the other

¹⁶⁴For assessing the incremental information content when using the level and change of the variable as a proxy for its unexpected components in the regression model see chapter 5, section 5.4.3.

¹⁶⁵ This study was one of the little studies that documented incremental information content for cash flow from operations by using the change, and the level and the change in cash flow and earnings as a proxy for their unexpected amounts.

¹⁶⁶ For more detail about this model, the variables definition, and the coefficients of the model, see the study of Cheng et al. (1996) earlier in this chapter.

four groups are classified as extreme. Moderate cash flow from operations observations, in this sub-sample, are classified into two groups: namely, moderate earnings and extreme earnings. The ratios of earnings to market value of equity at the end of year t were used to determine the two groups. All firms in each year are divided into nine groups depending upon the magnitude of these ratios with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratios. The middle six groups are classified as moderate and the other four groups are classified as extreme¹⁶⁷. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms. Then, they conducted the regression analysis for the previous model for the first sub-sample.

Where:

- The sum of $(\alpha_5 + \alpha_7)$ is the sum of the estimated coefficients of the change and level of earnings in the existence of its extremity.
- The sum of $(\alpha_6 + \alpha_8)$ is the sum of the estimated coefficients of the change and level of *moderate* cash flow from operations conditioned on the extremity of earnings.

The results of the first sub-sample of moderate cash flow showed a positive and significant value for the sum of $(\alpha_6 + \alpha_8)$ and a negative and significant value for the sum of $(\alpha_5 + \alpha_7)$.

(2) The second sub-sample represented extreme cash flow from operations. The ratios of cash flow to market value of equity at the end of year t are used to determine this sub sample. All firms in each year are divided into nine groups depending upon the magnitude of these ratios with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratios. The middle six groups are classified as moderate and the other

¹⁶⁷ As another method for measuring the extremity of cash flow and earnings, they divided their sample for each sample year into two groups: moderate cash flow, and extreme cash flow. Moderate cash flow is defined as the observations, from the whole sample of the study, which the absolute value of their cash flow from operations changes lie below the yearly median. Moderate cash flow from operations observations, in this sub-sample, are classified into two groups: moderate earnings and extreme earnings based on whether the absolute value of their earnings changes lie above or below the yearly median. Firms falling below the median are classified as moderate and firms failing above the median as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms. This alternative earnings extremity measure estimated from the magnitude of scaled changes in earnings yield similar results as the results obtained when earnings extremity is measures by earnings to price ratios.

four groups are classified as extreme. Extreme cash flow from operations observations, in this sub-sample, are classified into two groups: namely, moderate earnings, and extreme earnings. The ratios of earnings to market value of equity at the end of year t were used to determine the two groups. All firms in each year are divided into nine groups depending upon the magnitude of these ratios with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratios. The middle six groups are classified as moderate and the other four groups are classified as extreme¹⁶⁸. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms. Then, they conducted the regression analysis for the previous model for the second sub-sample.

Where:

- The sum of $(\alpha_5 + \alpha_7)$ is the sum of the estimated coefficients of the change and level of earnings in the existence of its extremity.
- The sum of $(\alpha_6 + \alpha_8)$ is the sum of the estimated coefficients of the change and level of *extreme* cash flow from operations conditioned on the extremity of earnings.

The results of the second sub-sample of extreme cash flow showed a positive but not significant value for the sum of $(\alpha_6 + \alpha_8)$ ¹⁶⁹ and a negative and significant value for the sum of $(\alpha_5 + \alpha_7)$.

Cheng & Yang explained the results of the first sub-sample and second sub-sample as follows: the effect of extreme earnings lead to incremental information content only for moderate cash flow and not for extreme cash flow. However, these results were not strong enough for extreme cash flow

¹⁶⁸ As another method for measuring the extremity of cash flow and earnings, they divided their sample for each sample year into two groups: moderate cash flow, and extreme cash flow. Extreme cash flow is defined as the observations, from the whole sample of the study, which the absolute value of their cash flow from operations changes lie above the yearly median. Extreme cash flow from operations observations, in this sub-sample, are classified into two groups: moderate earnings and extreme earnings based on whether the absolute value of their earnings changes lie above or below the yearly median. Firms falling below the median are classified as moderate and firms falling above the median as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms. This alternative earnings extremity measure estimated from the magnitude of scaled changes in earnings yield similar results as the results obtained when earnings extremity is measured by earnings to price ratios.

¹⁶⁹ The sum of $(\alpha_6 + \alpha_8)$ was positive but not significant based on the pooled regression. However, this sum was positive and significant at 5% level of significance based on cross-temporal t -statistics.

where the sum of $(\alpha_6 + \alpha_8)$ was positive and significant at 5% level of significance based on cross-temporal t -statistics.

To assess the effect of the cash flow extremity on the incremental information content of earnings. They estimate the following model:

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \epsilon_{it}$$

In this model, they divided their sample for each sample year into two groups: moderate cash flow and extreme cash flow based on whether the absolute value of their cash flow changes lie above or below the yearly median. Firms falling below the median are classified as moderate and firms falling above the median as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms. As another method for measuring cash flow extremity, they divided their sample for each sample year into two groups: moderate cash flow and extreme cash flow. The ratios of cash flow to market value of equity at the end of year t are used to determine the two groups. All firms in each year are divided into nine groups depending upon the magnitude of these ratios with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratios. The middle six groups are classified as moderate and the other four groups are classified as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms.

The coefficients $(\alpha_1 + \alpha_3)$ and $(\alpha_2 + \alpha_4)$ represented estimates of the response coefficients of unexpected components of earnings and cash flow respectively, when cash flow is predominantly moderate. In the same way, the sum of coefficients $(\alpha_5 + \alpha_7)$ and $(\alpha_6 + \alpha_8)$ represented estimates of the response coefficients of unexpected components of earnings and cash flow respectively, for firms with predominantly extreme cash flow.

The results showed that the sum of coefficient $(\alpha_2 + \alpha_4)$ was positive and significant which confirms the incremental explanatory power of cash flow of predominantly permanent cash flow. The sum of coefficients $(\alpha_1 + \alpha_3)$ was positive and significant which suggests that earnings also have incremental

information content when cash flow is moderate. The sum of coefficients ($\alpha_6 + \alpha_8$) & ($\alpha_5 + \alpha_7$) were negative and significant this implies that when cash flow is extreme, the market will discount the weights of both earnings and cash flow. The negative effect of cash flow extremity on cash flow coefficients, ($\alpha_6 + \alpha_8$), confirms that extreme cash flow is less informative than moderate cash flow. However, the negative effect of cash flow extremity on earnings coefficients, ($\alpha_5 + \alpha_7$), does not support the proposed hypothesis that earnings have a greater impact on abnormal returns in the presence of large extreme in cash flow.

To control for the extremity of earnings itself when assessing the effect of cash flow extremity on incremental information content of earnings, the whole sample of the study was divided into two sub-samples, moderate earnings and extreme earnings, as follows.

(1) The first sub-sample represented moderate earnings. The ratios of earnings to market value of equity at the end of year t are used to determine this sub sample. All firms in each year are divided into nine groups depending upon the magnitude of these ratios with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratios. The middle six groups are classified as moderate and the other four groups are classified as extreme. Moderate earnings observations, in this sub-sample, are classified into two groups: moderate cash flow and extreme cash flow. The ratios of cash flow to market value of equity at the end of year t were used to determine the two groups. All firms in each year are divided into nine groups depending upon the magnitude of these ratios with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratios. The middle six groups are classified as moderate and the other four groups are classified as extreme¹⁷⁰. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms.

¹⁷⁰ As another method for measuring the extremity of earnings and cash flow, they divided their sample for each sample year into two groups: moderate earnings, and extreme earnings. Moderate earnings are defined as the observations, from the whole sample of the study, which the absolute value of their earnings changes lie below the yearly median. Moderate earnings observations, in this sub-sample, are classified into two groups: moderate cash flow and extreme cash flow based on whether the absolute value of their cash flow changes lie above or below the yearly median. Firms falling below the median are classified as moderate and firms falling above the median as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms. This alternative cash flow extremity measure estimated from the magnitude of scaled changes in cash flow yield similar results as the results obtained when cash flow extremity is measures by cash flow to price ratios.

Then, they conduct the regression analysis for the previous model mentioned before.

Where:

- The sum of $(\alpha_5 + \alpha_7)$ is the sum of the estimated coefficients of the change and level of *moderate* earnings conditioned on the extremity of cash flow.
- The sum of $(\alpha_6 + \alpha_8)$ is the sum of the estimated coefficients of the change and level of cash flow from operations in the existence of its extremity.

The results of the sub-sample of moderate earnings showed a positive and significant value for the sum of $(\alpha_5 + \alpha_7)$ and a negative and significant value for the sum of $(\alpha_6 + \alpha_8)$.

(2) The second sub-sample represented extreme earnings. The ratios of earnings to market value of equity at the end of year t are used to determine this sub sample. All firms in each year are divided into nine groups depending upon the magnitude of these ratios with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratios. The middle six groups are classified as moderate and the other four groups are classified as extreme. Extreme earnings observations, in this sub-sample, are classified into two groups: moderate cash flow and extreme cash flow. The ratios of cash flow to market value of equity at the end of year t were used to determine the two groups. All firms in each year are divided into nine groups depending upon the magnitude of these ratios with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratios. The middle six groups are classified as moderate and the other four groups are classified as extreme¹⁷¹. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms.

¹⁷¹ As another method for measuring the extremity of cash flow and earnings, they divided their sample for each sample year into two groups: moderate earnings, and extreme earnings. Extreme earnings are defined as the observations, from the whole sample of the study, which the absolute value of their earnings changes lie above the yearly median. Extreme earnings observations, in this sub-sample, are classified into two groups: moderate cash flow and extreme cash flow based on whether the absolute value of their cash flow changes lie above or below the yearly median. Firms falling below the median are classified as moderate and firms falling above the median as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms. This alternative cash flow extremity measure estimated from the magnitude of scaled changes in cash flow yield similar results as the results obtained when cash flow extremity is measures by cash flow to price ratios.

Then, they conduct the regression analysis for the previous model mentioned before.

Where:

- The sum of $(\alpha_5 + \alpha_7)$ is the sum of the estimated coefficients of the change and level of *extreme* earnings conditioned on the extremity of cash flow.
- The sum of $(\alpha_6 + \alpha_8)$ is the sum of the estimated coefficients of the change and level of cash flow from operations in the existence of its extremity.

The results of the sub-sample of extreme earnings showed a negative and significant value for the sum of $(\alpha_5 + \alpha_7)$ and a negative and significant value for the sum of $(\alpha_6 + \alpha_8)$.

Cheng & Yang explained the results of the first sub-sample and second sub-sample as follows: the effect of extreme cash flow lead to incremental information content only for moderate earnings and not for extreme earnings.

Cheng & Yang concluded that "(1) only moderate cash flow is supplementary to earnings in firm valuation; (2) likewise, only moderate earnings serve a supplementary role to cash flow in firm valuation" (P. 105).

According to Cheng & Yang the first result means that without controlling for cash flow extremity, the studies which investigate the effect of earnings extremity on the incremental information content of cash flow may fail to find incremental information content for cash flow. The second result means that for most investors primarily focusing on earning information and treating cash flow as secondary information, in the presence of the extremity of cash flow the incremental information content of earnings (extreme earnings) may be greatly undermined. This indicates that a strong use of cash flow information.

4.3.2.2 Main U.K. studies

(1) Ali & Pope (1995)

Ali & Pope (1995) examined the incremental information content of three performance measures: earnings, funds flow, and cash flow. Based on 247 U.K. firms with a December year end, covering the period from 1984 to 1990 (7 years & 1160 firm-years), they employed three innovations used previously in the earnings return relation. First: using the current level of earnings together with the change in earnings as a proxy for its unexpected components¹⁷² (following Easton & Harris, 1991). Second: using time-varying parameters in the earnings-return relation instead of constraining the parameters to be constant across years (following Strong & Walker, 1993). Third: using a specific non-linear regression for the relation between returns and earnings instead of a linear relation (following Freeman & Tse, 1992). The objective of using these three innovations was to improve the explanatory power of the models which examine the incremental information content of cash flows and earnings.

To assess the incremental information content of earnings, funds flow, and cash flow, Ali & Pope estimated four models. Each model included one of the previous three innovations whereas the fourth model included all three innovations. The dependent variable was the market adjusted return, defined as the annual stock return net of market index for the period¹⁷³ with a four month lag period¹⁷⁴, whereas the independent variables¹⁷⁵ were defined by the first difference and the level of the variables themselves deflated by the beginning-of-the fiscal year market value of equity.

The results showed that earnings and funds flow have incremental information content in all four models and the response coefficients of unexpected earnings and unexpected funds flow were positive in all the years. Cash flow exhibited

¹⁷² To assess the incremental information content when using the level and change of the variable as a proxy for its unexpected components in the regression model, see chapter 5, section 5.4.3.

¹⁷³ To estimate market-adjusted return, Ali & Pope used a proxy for market returns. Their proxy was the simple average of the respective annual holding period returns of all the U.K. firms for which returns is available on the Global Vantage issue file. The Global Vantage Database was the source of the data in this study.

¹⁷⁴ For more details about the lagged return window see chapter 5, section 5.4.1.

¹⁷⁵ The independent variables in this study were defined similar to those employed by Bowen et al. (1987) and Ali (1994).

incremental information content only in model 4 (the non-linear model with time varying parameters). However, in this fourth model the incremental information content of cash flow did not exist each year where the response coefficient on unexpected cash flow was not positive in all the years. In summary, this study showed relatively weak evidence in support of the incremental information content of cash flow (Green, 1999).

(2) Garrod & Hadi (1998)

The sample size in this study was 156 British firms from the 1000 largest industrial companies (i.e. excluding financials) quoted on the London Stock Exchange and available on DataStream database and covering the period from 1977 to 1991.

Garrod & Hadi explored whether the five sub-titles of the British accounting standard of cash flow statements (*FRS 1*) have incremental information content beyond each other. To assess this issue, they estimated a regression model by pooling data over all years of the study. The dependent variable was defined as the cumulative market model abnormal return over a yearly holding period with a four month lag period, whereas the independent variables were the first difference of seven components¹⁷⁶, scaled by the beginning-of- the fiscal year market value of equity,: (1) net cash flow inflow from operations, (2) net cash outflow from return on investment and servicing of finance, (3) cash outflow from taxation, (4) net cash outflow from investments, (5) net cash inflow from financing, (6) net change in cash¹⁷⁷, and (7) accruals¹⁷⁸. The results showed that (i) variables 1, 6, and 7 have incremental information content, (ii) variable 2 and variable 4 have incremental information content with negative coefficients, and (iii) variables 3 and 5 did not have incremental information content.

They explained these results as follows: (i) because both variables 2 & 4 represent net cash outflows the results indicate a negative share return response

¹⁷⁶ This study used proxy cash flow variables as cash flow data has only been mandatory from 1992 onward after the accounting standards Board (ASB) released Financial Reporting standard (FRS) No.1: Cash Flow statements.

¹⁷⁷ Net change in cash included due to the requirement under FRS1 to disclose cash as the aggregate of cash and cash equivalents.

¹⁷⁸ Accruals were defined as the difference between reported earnings and reported total cash flow. Thus, accruals contain short term and long term accruals.

to both the sum of debt interest and dividends payments and investment respectively, and (ii) variable 5 did not have incremental information content and this result is inconsistent with Livnat & Zarowin (1990) and may have resulted from definitional differences of net cash inflow from financing between American accounting standard of cash flow statement (*FASB 95*) and British accounting standard of cash flow statements (*FRS 1*). Under *FASB 95* financing cash flow includes dividends paid. Under *FRS 1*, in contrast, it is reported in conjunction with net interest payments (which under *FASB 95* are included within cash flow from operations) under its own separate heading, (iii) variable 3 did not have incremental information content because tax payments figure can be readily and accurately estimated from earlier period's accrual numbers, and (iv) variable 7 is significant, which implies that accrual adjustments are positively valued.

Consistent with recent work, Garrod & Hadi re-estimated their model after including both the level and the change of the above seven components, scaled by the beginning of the fiscal year market value of equity, in the regression model as independent variables¹⁷⁹. The results from the model which include one of the recent innovations in earnings response modelling (using the level and the change as a proxy for the unexpected component of the explanatory variables) were consistent with the results obtained from their first model where: (i) variables 1, 2, 4, and 7 have incremental information content, and (ii) variables 5 and 3 did not have incremental information content.

Also, the study did not support: (i) further disaggregation for the five sub-titles of the British accounting standard of cash flow statements, or (ii) any additional requirement to disclose cash flow per share.

Garrod & Hadi concluded that "apart from the tax cash flow, all FRS1 subheadings are valuation relevant" (P.628).

(3) Green (1999)

Green (1999) investigated whether 'the quality of earnings' as measured by the firm-specific relationship between profitability and cash generating ability affects

¹⁷⁹ Variable 6 has been deleted from this model due to the multicollinearity problem.

the securities market's differential pricing of cash flow from operations and current accruals. Green argued that the incremental information content of cash flow exists when the quality of earnings is low.

Green estimated a pooled cross-sectional regression model based upon 4531 firm-years, for a sample of 197 British firms over a 23-year period¹⁸⁰; covering the period from 1971 to 1993. To reduce the potential problems of cross-sectional dependence in the residuals, the sample selection was not restricted to a common time period or to a common year end. The study defined three performance measures: (i) earnings, (ii) cash flow, and (iii) current accruals. 'Earnings' was defined as net profit derived from normal trading activities before depreciation and operating provisions, 'cash flow' was defined as earnings minus change in stock and change in total debtors and equivalents plus the change in creditors during the year¹⁸¹, and 'current accrual' was defined as the difference between earnings and cash flow¹⁸². In the pooled regression, the dependent variable was the change in market capitalisation over yearly holding period scaled by the market capitalisation at the beginning of the year, ending four months after the fiscal year end, whereas the independent variables were the current level and the first lag of cash flow from operations and the current level and the first lag of current accrual¹⁸³. All these variables were deflated by the market capitalisation at the beginning of the respective year of cash flow and current accrual. The regression included two other independent variables: (i) the change in the total market price index in period t ending four months after the fiscal year end scaled by the total market price index in period $t-1$, and (ii) dividends paid by each firm in period t scaled by market capitalisation at period $t-1$.

Firms were divided into four quartiles with an approximately equal number of firms per quartile ranked by the firm-specific contemporaneous time-series

¹⁸⁰ For the purpose of measuring the firm-specific relationship between profitability and cash generating ability firms were selected on the basis that continuous earnings data is available on the Datastream database for at least 23 years.

¹⁸¹ Cash flow variable defined in this study exclude income such as interest receivable. This is similar, but not identical to, the definition of cash flow according to FRS1 (1996).

¹⁸² In this study, earnings and cash flow differ only with respect to the change in working capital adjustment.

¹⁸³ For assessing the incremental information content when using the one-lag model see chapter 5, section 5.4.3.

correlation between change in (level) earnings and change in (level) operating cash flow. The first quartile consisted of those firms with the highest time-series correlations and the last quartile consisted of firms with the lowest time-series correlation. The rationale for dividing firms into quartiles is that to the extent that the firm-specific time-series correlation is low, then the incremental information content of cash flow may be observed.

The pooled regression model was estimated twice: (i) based on the entire pooled data, and (ii) based on the pooled data for each quartile¹⁸⁴. The results for the entire pooled data showed that cash flow from operation and current accruals have incremental information content beyond each other. However, with regards to the test performed on the equality of the estimated coefficients on the cash flow and accruals surprise variables, the results did not support the decomposition of earnings into its cash flow and accruals components. The results for each quartile showed that the estimated coefficients on both the cash flow and current accruals surprise variables were positive and significant for all the quartiles, indicating that both cash flow and accruals have incremental information content. However, with regards to the test performed on the equality of the estimated coefficients on the cash flow and accruals surprise variables, the results indicated that the incremental information of decomposition of the earnings surprise into its cash flow and accruals components exist only in the fourth quartile. These results suggested that, when the firm-specific time-series correlation between change in earnings and cash flow is low, the decomposition of earnings into cash flow and accruals are value relevant.

Also in this study, Green estimated three other pooled regressions with the same variables mentioned in the above model; but he replaced the current level and the first lag of current accruals and the current level and the first lag of cash flow with: (i) in the First model, change in earnings and change in cash flow, (ii) in the second model, the level and change in earnings and the level and change in cash flow, and (iii) in the third model, the current level and the first lag of

¹⁸⁴ Each time, the pooled regression was estimated by using (i) ordinary-least squares (OLS) regression, and (ii) Kmenta's estimation procedure which addresses the econometric problems of autocorrelation and heteroscedasticity. The results were similar. For more details of Kmenta's estimation procedure, see Green (1999) Appendix A.

earnings and the current level and the first lag of cash flow. These three models have been estimated based on the pooled regression model. The results of all these three models did not support the incremental information content of cash flow for the entire pooled data.

Green concluded that

"The decomposition of an 'earnings surprise' into its cash flow and accruals components, provide incremental information content to earnings when the firm-specific time-series correlations between earnings and cash flow is low. Furthermore, the cash flow surprise is valued more than the accruals surprise. This finding is consistent with the ASB's notion that cash flow disclosures attest to the 'quality of earnings' (PP. 407- 408).

(4) Charitou et al. (2001)

Following the Cheng et al. (1996) study into U.S. market, Charitou et al. (2001) examined whether the incremental information content of cash flow from operations increases when earnings are transitory. Like the Cheng et al. (1996) study, they measured transitory items using earnings change scaled by beginning-of-period price and the earnings-to-price ratio. As an extension to Cheng et al., they address two other points: (i) the impact of earning growth (measured by market to book ratio of the firm's equity) on the coefficients of earnings and cash flow, and (ii) the impact of firm size (measured by market value) on the coefficients of earnings and cash flow.

In respect to the impact of transitory earnings, they hypothesise that the earnings coefficient decreases and the cash flow coefficient increases as earnings become transitory. In relation to earnings growth, they hypothesise that both earnings and cash flow coefficients are higher for high growth firms for reasons related to the size and the persistence of abnormal earnings in such firms. Regarding firm size, they hypothesise that both earnings and cash flow coefficients are lower for large firms due to: (i) information environment reasons, and (ii) possible greater importance of liquidity considerations in small firms.

Based on a sample size¹⁸⁵ of 3346 U.K. firm year observations over the period from 1985 to 1993, Charitou et al. estimated four regression models. In all the models they employed raw returns, measured over a 15 month period ending 3 months after the fiscal year end, as a dependent variable. They included the level and change in earnings¹⁸⁶ and the level and change in cash flow from operations¹⁸⁷ scaled by the beginning-of-year market value of equity as explanatory variables, in addition to, the natural logarithm of market value of equity to the book value of equity and the natural logarithm of market value of equity (as a proxy for firm size). The latter two variables were included to reflect the current importance of these two variables as risk proxies. To assess the incremental information content of cash flow and earnings, they estimated their models by using two estimation methods: (i) cross-sectional for all firms and for all years in the sample (pooled cross-sectional), and (ii) year by year method¹⁸⁸ (cross sectional by year). The first model was the base model, and the other three models were an extension of this model.

The first model consisted of both the level and change of earning and both the level and change of cash flow from operations scaled by the beginning-of-year market value of equity as explanatory variables in addition to (i) the natural logarithm of market value of equity to the book value of equity, and (ii) the natural logarithm of market value of equity. Their results showed that earnings have incremental information content whereas cash flow from operations reported mixed results¹⁸⁹. In relation to the risk proxies, the coefficient of firm

¹⁸⁵ The sample selection was not restricted to any industry or fiscal year-end. It was merely restricted to firms with no change in fiscal year-end.

¹⁸⁶ Earnings were defined as net income before extraordinary items, discontinued operations, special and non-operating items.

¹⁸⁷ Cash flow from operations was defined as operating earnings adjusted for all non-current accruals not affecting working capital (e.g. depreciation, amortization, deferred taxes, equity earnings) plus net changes in all working capital accounts related to operations, except for changes in cash, marketable securities, and debt in current liabilities.

¹⁸⁸ In this method, they employed cross-temporal *t*-statistics to assess the incremental information content of cash flow and earnings. Cross-temporal *t*-statistics was computed as the mean annual coefficient divided by the standard error of the mean coefficient over the 9 annual cross-sectional regressions

¹⁸⁹ The results obtained from the annual cross-sectional regression showed incremental information content of cash flow from operations beyond earnings. However, the results obtained from the annual pooled regression did not support the incremental information content for cash flow beyond earnings.

size was significantly negative and the coefficient of market to book value ratio was statistically negative at 10% for the pooled regression only.

The second, third, and fourth model were estimated using the following regression equation.

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \alpha_{9t} MB_{it-1} + \alpha_{10t} MV_{it-1} + \varepsilon_{it}$$

Where:

R_{it} is raw returns, measured over 15 months period ending 3 months after the fiscal year end, ΔE_{it} (E_{it}) is the change (level) in earnings and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations; for firm i in year t . Earnings and cash flow were deflated by the market value of equity at the beginning of year t . MB_{it-1} is the natural logarithm of market value of equity to the book value of equity, MV_{it-1} is the natural logarithm of market value of equity. D_{it} is a dummy variable which equals to 1 or 0. The difference between the second, third, and fourth models was represented in the definition of the dummy variables where: (i) the second model was employed to examine the effect of transitory earnings on the coefficients of earnings and cash flow, (ii) the third model was employed to measure the impact of earning growth on the coefficients of earnings and cash flow, and (iii) the fourth model was employed to measure the impact of firm size on the coefficients of earnings and cash flow.

The second model was similar to the model estimated by Cheng et al.¹⁹⁰ (1996). In this model, they divided their sample for each sample year into two groups: permanent earnings and transitory earnings based on whether the absolute value of their earnings changes lies above or below the yearly median. Firms falling below the median are classified as permanent and firms failing above the median as transitory. $D_{it} = 0$ for permanent firms and $D_{it} = 1$ for transitory firms. The results showed that earnings response coefficients diminish when earnings are transitory where the sum of coefficients ($\alpha_5 + \alpha_7$) was negative and significant

¹⁹⁰ See the study of Cheng et al (1996) earlier in this chapter.

which is consistent with a smaller impact from transitory earnings on abnormal returns. In contrast to Cheng et al. (1996) study, however there is no corresponding increase in the cash flow coefficient where the sum of coefficients ($\alpha_6 + \alpha_8$) was positive but not significant. In other words, cash flow from operations did not have incremental information content when earnings are extreme. The results in relation to the explanatory power of firm size and market to book were similar to those reported in model 1, with some stronger evidence in support of the significance of market to book where the coefficient of market to book value ratio was statistically negative at 5 % for the pooled regression and at 10 % for the year by year regression (cross-sectional regression).

In the third model, to test the earnings growth hypothesis, they divided their sample for each sample year into two groups: low-growth firms and high-growth firms based on whether the natural logarithm of the ratio of market value of equity to book value of equity at the beginning of year t lies above or below the yearly median. Firms falling below the median are classified as low and firms falling above the median as high. $D_{it} = 0$ for low firms and $D_{it} = 1$ for high firms. The results showed strong evidence of a higher earnings coefficient for high growth firms and some evidence that cash flow coefficient is higher for high growth firms. The results in relation to the explanatory power of firm size and market to book provided a strong indication for the importance of market to book in addition to firm size as important factors in explaining security returns.

In the fourth model, to test the firm size hypothesis, they divided their sample for each sample year into two groups: small firms and large firms based on whether the natural logarithm of the market value of equity at the beginning of year t lies above or below the yearly median. Firms falling below the median are classified as small and firms falling above the median as large. $D_{it} = 0$ for small firms and $D_{it} = 1$ for large firms. The results showed some evidence of a lower earnings response coefficient for larger firms but no evidence of a lower cash flow coefficient for such firms. In relation to the risk proxies, the results were very similar to those reported in model 2. Specifically, the results confirmed the importance of firm size as a determinant of security returns.

In order to capture capital market anticipation of the first three months of the fiscal year end, the above results of this study employed a 15 month return interval to result in higher explanatory power than annual interval. This study also considered an annual return interval by re-estimating the previous models based on pooled regression for an annual return interval ending three months after the fiscal year end, and an annual return interval ending four months after the fiscal year end. The results showed continued support for the incremental information content of earnings beyond cash flow and supported the hypotheses of these studies regarding the impact of transitory earnings, earning growth, and firm size on earnings response coefficient. There is more consistent support for the incremental information content of cash flow beyond earnings but there is little support for the previous hypotheses in relation to their impact on the coefficient of cash flow from operations.

Charitou et al. concluded that "our results provide strong support for the relevance of contextual factors in modelling the relationship between security returns, earnings and cash" (P. 588).

4.3.2.3 Main conclusions

The previous review of the contemporaneous work on the incremental information of cash flow and earnings presented main recent U.S. and U.K. papers which have attempted to employ some of the most recent innovations in earning return relation to incremental information content of cash flow and earnings studies. The focus of recent work has been distinguished by using a research methodology that incorporates conceptual factors which may be relevant to clarify the role of cash flow and earnings in explaining security returns (Charitou et al, 2001). This line of research triggered by earnings return relation studies which suggested that the magnitude of earnings response coefficient may be affected by a number of factors such as earnings permanence (Charitou et al, 2001).

In the U.S, the review of the contemporaneous work on incremental information of cash flow and earnings included five studies: (i) Ali (1994), (ii) Cheng et al. (1996), (iii) Pfeiffer et al. (1998), (iv) Pfeiffer & Elgers (1999), and (v) Cheng & Yang (2003). The following points regarding these studies can be noted.

- Ali (1994) extended prior work on earnings return relation, which showed that extreme earnings have less information content than moderate earnings, to incremental information content of cash flow and earnings studies. He showed that moderate cash flow is more informative than extreme ones. However, Ali did not examine the effect of extreme earnings on the incremental information content of cash flow.
- Cheng et al. (1996) supported the incremental information content of cash flow from operations when earnings are extreme. However, they did not isolate extreme cash flow apart from moderate ones when they examine the incremental information content of cash flow.
- Pfeiffer et al. (1998) and Pfeiffer & Elgers (1999) showed that earnings components expectations come from a random-walk model employed in previous studies may be responsible for the failure of detecting a higher valuation for cash flow from operations over current accruals. These results support using the level and change of earnings components for estimating their unexpected portions or employing a model that incorporates the historical auto- and cross-correlation structure in the components for estimating earnings components expectations.
- Cheng and Yang (2003) developed a methodology in which we can isolate the moderate cash flow from operations and earnings apart from extreme ones. Their methodology enabled them to measure the incremental information content of cash flow and earnings when earnings are extreme whilst controlling for the extremity of cash flow and vice versa. To measure the extremity of cash flow and earnings, they combined the work of Ali's (1994) and Cheng et al., (1996). This study supported the incremental information content of moderate (not extreme) cash flow from operations when earnings are extreme.

In U.K., the review of the contemporaneous work on incremental information content of cash flow and earnings included four studies: (i) Ali & Pope (1995), (ii) Garrod & Hadi (1998), (iii) Green, (1999), and (iv) Charitou et al. (2001). The following points regarding these studies can be noted.

- Ali & Pope (1995) reported incremental information content for cash flow from operations only in their nonlinear model; however, Kothari (2001) criticised in general the models which employed nonlinear relations among the variables. He stated that "while the research on non-linearity is successful in improving the return-earnings regression fit, a strong economic foundation for the modelling is not apparent. Therefore, researcher must exercise caution in employing ad hoc statistical refinements" (P. 135).
- The study by Garrod & Hadi (1998) represents examination of the information content of the cash flow components required by FRS1. Because they employed estimate of cash flow figures further research is required to replicate these types of studies as suggested by Neill et al. (1991) to provide a direct evaluation for the each component for FRS 1 and FRS1 (revised 1996).
- Green (1999) was able to find incremental information content for cash flow from operations when the firm-specific time-series correlation between earnings and cash flow is low. The distinguished work of Green represented in using ASB's opinion of the quality of earnings, measured by the relation between earnings and cash flow from operations, to distinguish between high and low quality of earnings. It will be useful if the methodology of Green (1999) is compared to the methodology of Cheng et al. (1996) related to measuring the extremity of earnings to provide conclusive opinion regarding the effect of extreme earnings on the incremental information of cash flow and earnings.
- Charitou et al. (2001) similar to Cheng et al. (1996) and Cheng & Yang (2003) addressed the issue of the effect of extreme earnings on the incremental information content of cash flow and earnings. Their results did not support the idea that cash flow has information content when earnings are extreme. However, these results can be attributed to two main reasons: (i) the differences in the time series properties of earnings and cash flow and/ or differences in investor utilisation of cash flow

information between U.S. & U.K. (Charitou et al., 2001), and (ii) Charitou et al. (2001) did control for the extreme cash flow itself¹⁹¹.

As a summary, the results of recent incremental information content of cash flow and earnings studies showed that cash flow from operations may perform a role in explaining security returns when the information content of earnings is limited by their transitory items. Moreover, employing both the level and the change of cash flow and earnings as a more accurate proxy for measuring their unexpected amounts reduce the measurement error in these unexpected amounts when cash flow and earnings contain extreme (transitory) components which can lead to detect an incremental information content for cash flow information beyond earnings.

Table 4-2 provides a summary for contemporaneous studies on the incremental information content of cash flow from operations and accruals.

¹⁹¹ In other words, Charitou et al. (2001) did not isolate extreme cash flow apart from moderate ones when they examine the effect of extreme earnings on the incremental information content of cash flow and earnings.

Table 4-2 Main contemporaneous studies on incremental information content of cash flow and accruals

Authors & Year	Period examined	Window	Items examined	Main conclusion
1. Ali (1994) (U.S.)	1974 to 1988	12 months	Earnings, working capital from operations, and cash flow from operations.	The incremental information content of cash flow from operations could be increased by allowing the security price responses to the unexpected components of cash flow from operations to vary with the absolute value of the components.
2. Ali & Pope (1995) (U.K.)	1984: 1990	12 months	Earnings, funds flow, and cash flow from operations.	Earnings and funds flow have incremental information content. Cash flow has incremental information content only in the model which employed three previously innovations used in earnings return relation. First, level and change of the cash flow. Second, time varying parameter. Third, nonlinear relationship among the variables. However, in this model, the incremental information content of cash flow did not exist each year.
3. Cheng et al. (1996) (U.S.)	1989: 1992	12 months	Earnings and cash flow	"The incremental information content of cash flow from operations is found to increase with decreases in the permanence of earnings" (P. 180).
4. Pfeiffer et al. (1998) (U.S.)	1980: 1996	12 months	Earnings, working capital from operations, and cash flow from operations.	This study documented higher valuations of cash flow from operations relative to current accruals, when market expectations are represented using the dependency-based predictions rather than the random walk model.

5. Garrod & Hadi (1998) (U.K.)	1977: 1991	12 months	The five sub-titles of the British accounting standard of cash flow statements (<i>FRS 1</i>).	Apart from cash outflow from taxation, all FRS1 subheadings are valuation relevant.
6. Pfeiffer & Elgers (1999) (U.S.)	1981: 1992	12 months 60 month	Cash flow from operations, current accrual, and non-current accruals.	Allowing for the market's multiyear correction of past mispricing and mean reversion in the earnings components lead to a significant valuation differences for cash flow from operations over both current accruals and non-current accruals.
7. Green (1999) (U.K.)	1971: 1993	12 months	Earnings, cash flow from operations, and current accruals.	The decomposition of earnings into cash flow and accruals are value relevant when the firm-specific time-series correlation between change (level) in earnings change (level) and cash flow is low.
8. Charitou et al. (2001) (U.K.)	1985: 1993	15 months 12 months	Earnings and cash flow	The models which incorporate contextual factors such as earnings permanence, earnings growth, and firm size, to clarify the impact of these factors on the magnitude of the earnings response coefficient showed that (i) earnings are the dominant variable in explaining security return, and (ii) there is some evidence of the incremental value relevance of cash flow in such models.
9. Cheng & Yang (2003) (U.S.)	1989: 1997	12 months	Earnings and cash flow	Cheng & Yang concluded that "(1) only moderate cash flow is supplementary to earnings in firm valuation; (2) likewise, only moderate earnings serve a supplementary role to cash flow in firm valuation" (P. 105).

4.4 Contributions of this study¹⁹²

In the part of the literature upon which we rely as an approach for this study, market based accounting research (MBAR), it was well documented that there was a contemporaneous relation between returns and earnings. The literature went on to the next logical step and decomposed earnings into its components. The reporting of earnings components, i.e., operating cash flow, current accruals, and non-current accruals, rests on the premise that such disaggregated disclosures are informative to investors (Pfeiffer & Elgers, 1999). Jennings (1990) stated that:

"if the criterion for evaluating the disclosures of income components is association with returns, knowledge of the components of income is preferred by investors only when the components are valued (associated with return) differently from each other. For components that are valued by the market equivalently, disclosure of their sum is sufficient because investors are indifferent to which components contributed more or less to income" (P.926).

The results of the recent U.S. studies (e.g., Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang; 2003; among others) provided evidence of incremental information content of cash flow from operations beyond earnings. This means that cash flow from operations has higher market valuation than total accruals. However, evidence of incremental information content of cash flow from operations beyond earnings which imply that cash flow from operations is more highly valued than total accruals does not necessarily imply that there is an incremental information content of cash flow from operations beyond working capital from operations which imply that cash flow from operations is more highly valued than current accruals. Given (i) the higher valuation of both current accruals and cash flow from operations than non-current accruals¹⁹³ (this issue has been widely documented see for example Rayburn, 1986; Wilson, 1986 & 1987; Pfeiffer et al., 1998; Pfeiffer & Elgers, 1999), and (ii) the weak evidence on the differential higher valuations of cash flow over current accruals (see for example Rayburn, 1986; Bernard & Stober, 1989; Jennings, 1990; Pfeiffer et al.,

¹⁹² For more details about the contribution of this study see chapter 1.

¹⁹³ Non-current accruals are less valued than both current accruals and cash flow from operations. However, non-current accruals are considered informative component of earnings. See for example: Rayburn (1986), Bowen et al. (1987), Jennings (1990), Pfeiffer et al. (1998), and Pfeiffer & Elgers (1999).

1998¹⁹⁴), there are two possible interpretations of that evidence. One is that cash flow is more highly valued than current accruals. This interpretation supports the decomposition of earnings into its non-current accruals, current accruals and cash flow from operations components. An alternative interpretation is that cash flow from operations and current accruals are valued equivalently. This interpretation supports the decomposition of earnings into only its non-current accruals, and working capital from operations components.

This study places the incremental information content of three performance measures: (i) earnings, (ii) working capital from operations, and (iii) cash flow from operations in sharp focus based upon recent data, a large sample size, actual cash flow figures, and the methodology of recent work on the incremental information content of cash flow from operations and earnings which employed the change and the level as explanatory variables in the regression technique and isolated the extreme components of explanatory variables apart from the moderate ones. This study adopts market-based accounting research (MBAR) to test its hypotheses and to achieve its objectives. The DataStream database is the source of the data. The analysis is conducted in two separate stages.

The goal of the first stage is to follow recent U.S. studies that examined the incremental information content of cash flow from operations and earnings and the effect of extreme earnings on the incremental information content of cash flow from operations. The goal of the second stage is to assess the generality of the findings of recent U.S. studies and to distinguish between the two alternatives mentioned above via an examination of the incremental information content of working capital from operations and cash flow from operations followed by an examination of the effect of extreme working capital from operations on the incremental information content of cash flow from operations

In the first stage, this study makes the following contributions to the incremental information content of cash flow and earnings literature in U.K. First, this study employs actual cash flow data; sample periods of most prior studies of cash flow

¹⁹⁴ Pfeiffer et al., (1998) reported a statistically significant differential valuation of cash flow and current accruals when they employed a pooled cross-sectional and time series data for estimating surprises in earnings, working capital from operations, and cash flow from operations.

and earnings used estimated cash flow number from balance sheet and income statements, in addition to, statement of changes in financial position. Second, none of the prior studies examined the effect of earnings extremity on the incremental information content of cash flow and earnings whilst controlling for the extremity of cash flow itself. Third, this study employs a large sample size for a more recent period (1996-2002). The sample size consists of 6851 firm year observations for a sample of 1634 British firms over 7 year periods from (1996 to 2002). Sample sizes in most prior studies were smaller hence limiting the generalisability of their conclusions.

In the second stage and as an additional contribution, this study assesses the results of the recent U.S. studies by presenting testable hypotheses on the incremental information content of cash flow from operations and working from operations in order to identify whether cash flow from operations and current accruals are valued differentially by investors and hence see whether the disaggregating of working capital components into current accruals and cash flow from operations are preferred by investors to disclose separately. Then, we examine the effect of extreme working capital from operations on the incremental information content of cash flow from operations to assess whether extreme working capital from operations lead to incremental information content of cash flow from operations.

4.5 Summary

This chapter presents and discusses prior work on incremental information content of cash flow and earnings. Three points have been presented in this chapter. First: the concept and the classifications of information content of cash flow and earnings studies. Second: prior work on incremental information content of cash flow and earnings. Third: contribution of the current study.

With respect of the first point and as presented, there are two types of information content studies of cash and earnings: relative information content and incremental information content studies. This study considers cash flow and accruals as integrated measures, not competing measures. This study investigates

therefore the incremental information content of earnings, working capital from operations, and cash flow from operations.

Regarding the second point, prior work has been divided into: early work and contemporaneous work on the incremental information content of cash flow and earnings. The main trends in contemporaneous work have been represented in (i) using both the level and change of cash flow and earnings as an accurate measure for their unexpected amounts, and (ii) address the issue of the effect of extreme earnings on the incremental information content of cash flow with isolating the moderate cash flow from operations apart from extreme ones.

Finally, the third point in this chapter presented the contribution of the current study. As shown before the contribution of this study is: (1) following recent U.S. work in this area, the study examines the incremental information content of cash flow and earnings with addressing some new issues which have not been considered in prior work in the U.K. in contrast with recent U.S. work, and (2) it assess the generality of the findings of recent U.S. studies in this area, as will be conducted in 1, by developing new hypotheses for testing the incremental information content of cash flow from operations and working capital from operations.

Research design, research hypotheses, and the methodology of testing the incremental information content of earnings, working capital from operations, and cash flow from operations are presented in the next chapter.

Chapter 5: Research design and the methodology for testing the incremental information content of earnings, working capital from operations, and cash flow from operations

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Chapter 5: Research design and the methodology for testing the incremental information content of earnings, working capital from operations, and cash flow from operations

5.1 Introduction

This chapter presents the research design and the methodology used to investigate the incremental information content of earnings, working capital from operations and cash flow from operations. This research methodology is based on recent work on the incremental information content of cash flow and earnings which employed an association study methodology over an annual holding period. The developments of the recent work, as presented in chapter 4, are represented in using the change and the level as explanatory variables in the regression technique and isolate the extreme components of explanatory variables apart from the moderate ones.

The investigation of the incremental information content of earnings, working capital from operations, and cash flow from operations is conducted in two separate stages¹⁹⁵. First, following recent U.S. work, the study investigates the incremental information content of cash flow from operations and earnings and the effect of extreme earnings on the incremental information content of cash flow from operations. Second, the study assesses the finding of recent U.S. studies that have examined the incremental information content of cash flow and earnings, as will be conducted in the first stage, by employing testable hypotheses to investigate the incremental information content of cash flow from operations and working capital from operations in separate empirical models to identify whether cash flow from operations and current accruals are evaluated differentially and whether extreme working capital from operations lead to incremental information content for cash flow from operations. The second stage is considered an evaluation for the results of the first stage.

This chapter is organised as follows: section 2 shows variable definitions, section 3 presents sample selection and data collection, section 4 provides the

¹⁹⁵ For the rationale of conducting these two separate stages, see research problem and contribution of this study in chapter 1.

methodology of testing the incremental information content of earnings, working capital from operations, and cash flow from operations and section 5 concludes the chapter.

5.2 Variables definition

The standard three variables used in the literature for testing the incremental information content of earnings, working capital from operations, and cash flow from operations are (i) earnings, (ii) working capital from operations, and (ii) cash flow from operations (e.g. Rayburn, 1986, Bowen et al., 1987; Board & Day, 1989; Board et al., 1989; Jennings, 1990; Ali, 1994; Ali & Pope, 1995; Pfeiffer et al., 1998; Pfeiffer & Elgers, 1999).

To achieve the research objectives and to test the research hypotheses and consistent with the two stages which are conducted in this study¹⁹⁶, the variables of this study are classified into two groups. Following recent U.S. and U.K. work on the incremental information content of cash flow and earnings (e.g., Cheng et al., 1996; Cheng et al., 1997; Charitou et al., 2001; Cheng & Yang; 2003; and among others), the first group of variables is selected to test the incremental information content of cash flow and earnings and the effect of extreme earnings on the incremental information content of cash flow from operations are (1) earnings, and (2) cash flow from operations.

Following previous work, mentioned above, the second group of variables is selected to test the incremental information content of working capital from operations and cash flow from operations and the effect of extreme working capital from operations on the incremental information content of cash flow from operations. It consists of (1) working capital from operations, and (2) cash flow from operations.

Finally, cash flow numbers which are employed in this study are obtained directly from the cash flow statements.

¹⁹⁶ For the rationale of conducting these two separate stages, see research problem and contribution of this study in chapter 1. Also, see section 5.4.3 in this chapter.

The variables¹⁹⁷ of the study, mentioned before, are defined and measured as follows.

5.2.1 Cash flow from operations and earnings variables

1. Cash flow from operations

Cash flow is defined as net cash flow from operating activities. This variable is obtained directly from DataStream (WorldScope item WC 04860¹⁹⁸).

2. Earnings

Earnings are defined as net income before extraordinary items and Dividends. This variable is obtained directly from DataStream (Worldscope item WC 01551).

Cash flow from operating and earnings are deflated by market value of equity at the beginning of each fiscal year as suggested by Christie (1987) to reduce the potential problems of heteroskedasticity. Market value is obtained directly from DataStream: (Worldscope item WC 08001).

5.2.2 Cash flow from operations and working capital from operations variables

1. Cash flow from operations

Cash flow is defined as net cash flow from operating activities. This variable is obtained directly from DataStream (WorldScope item WC 04860).

2. Working capital from operations

Working capital from operations is defined as funds from operations. This variable is obtained directly from DataStream (Worldscope item WC04201).

¹⁹⁷ See appendix A for details of the definitions of Worldscope items used to construct the variables of this study.

¹⁹⁸ (WC + Number) is the code of Worldscope item. World Scope company account system has been adapted by DataStream database since April 2003 onwards as a replacement of DataStream company account data.

Cash flow from operating and working capital from operations are deflated by market value of equity at the beginning of each fiscal year as suggested by Christie (1987) to reduce the potential problems of heteroskedasticity. Market value is obtained directly from DataStream: (Worldscope item WC 08001).

5.2.3 Share price variables

The DataStream return index is used for estimation purposes of unexpected share returns¹⁹⁹ which are employed as the dependent variable in this study. Since The Return index is available on DataStream for each share and for the Financial Times All Share Index (FTALLSH) from 1988 onwards, this variable is obtained directly from DataStream (DataStream code RI).

5.3 Data collection and sample selection

Financial data, accounting items and the return index, of this study are obtained from DataStream database in May 2004. The sample consists of all British firms quoted on London Stock Exchange²⁰⁰ in addition to dead British firms²⁰¹ over the period from 1995 to 2002²⁰².

The following criteria are applied to determine the sample of this study:

1. Firms should have accounting data or shares returns for at least one year over the period of the study (1995 to 2002).
2. Firms should not belong to the financial sector.²⁰³
3. The fiscal year ends of firms are stable during the period 1995 to 2002²⁰⁴.

¹⁹⁹ For the estimation of unexpected share returns, see section 5.4.1. in this chapter.

²⁰⁰ The equity list of all British firms quoted in London Stock exchange on DataStream is UKQI.

²⁰¹ To avoid survivorship bias this study includes dead British firms in addition to surviving firms. Dead firms are those which have merged, liquidated or become privately held. The equity list of dead British firms on DataStream is DEADUK.

²⁰² The empirical work of this study is confined to the periods after 1991, since in 1991 the Accounting Standard Board (ASB) in U.K. issued the cash flow statement (FRS No.1). Hence, we can use actual numbers of cash flow as shown in cash flow statement in contrast to most of the previous studies which relied on estimates of cash flows numbers.

²⁰³ Financial firms are excluded due to their own different characteristics and the different format of their financial statements. INDM3 datatype is used to exclude financial firms. INDM3 Datastream datatype returns the Datastream level 3 industrial classification name. Industrial classification name at level three on DataStream are Resources, Basic industries, Cyclical consumer goods, Non-cyclical consumer goods, Cyclical services, Non-Cyclical services, Utilities, information technology, and Financials.

The sample selection is not restricted to any industry or fiscal year-end. It was restricted only to firms with no change in fiscal year-end. After imposing the above three criteria and before excluding the firms that do not have the required items to calculate the variables of the study, the following two tables, Table 5-1 and 5-2, show the sample size for firms quoted on London Stock Exchange and for dead firms respectively.

Table 5- 1 Sample size for firms quoted on the London Stock Exchange and before excluding firms that have insufficient data to calculate the variables of the study

	Number of firms
The initial sample	1351
Exclude firms which have not data through all the period from 1995 to 2002.	(41)
Exclude financial firms.	(82)
Exclude firms which changed their financial year ends through the period from 1995 to 2002.	(176)
Sample size before excluding firms that have insufficient data to calculate the variables of the study.	1052

²⁰⁴ Firms that have more than ten days' difference between two consecutive year ends are excluded. WC 05350 is the code of Worldscoop item of firm' fiscal year end used to retrieve the fiscal year ends of firms.

Table 5-2 Sample size for dead firms and before excluding firms that have insufficient data to calculate the variables of the study

	Number of firms
The initial sample	4138
Exclude firms which have not data through all the period from 1995 to 2002.	(2998)
Exclude financial firms.	(181)
Exclude firms which changed their financial year ends through the period from 1995 to 2002.	(95)
Sample size before excluding firms that have insufficient data to calculate the variables of the study.	864

The above three criteria produced a sample of 1052 surviving firms and 864 dead firms. In this point, we combined firms quoted on the London Stock Exchange and dead firms. The total is 1916 firms. Cash flow from operations, earnings, and working capital from operations variables, mentioned previously, and monthly return index are downloaded from DataStream database for the previous number of firms. Another two criteria are imposed to determine the final sample of this study. First, the required accounting items for calculating the independent variables should be available. Second, the availability of the monthly return index to calculate the dependent variable.

Cash flows data is available on DataStream for a reasonable number of the British firms from 1995 upwards, but the study begins with the 1996 fiscal year. This is because the study employs changes in accounting items as independent variables (See section 5.4.2 and 5.4.3 later in this chapter).

According to Easton & Harris (1991) and Cheng et al. (1996) the deletion of outliers allows us to observe the incremental information content of cash flow from operations and earnings. Cheng & Yang (2003) excluded the two extreme percent that lie above 99% and below 1% of the distribution of earnings or cash flow from operations observations and reported deletion 2% from the sample of their study. Because of the possibility of data errors, Ali & Pope (1995) excluded

firm years for which the absolute value of the dependent variable or the independent variables exceeds 200%. Cheng et al. (1996) deleted 155 observations nearly equals 3% from their sample for which either the absolute value of the independent variables exceeds 1.5.

Following Cheng & Yang (2003) the two extreme percent of observations that lie above 99% and below 1% of the distribution of (i) changes in earnings or cash flow from operations or annual market adjusted return when conducting the first stage of this study (examine the incremental information content of cash flow from operations and earnings), and (ii) changes in working capital from operations or cash flow from operations or annual market adjusted return when conducting the second stage of the study (examine the incremental information content of cash flow from operations and working capital from operations) are considered as outliers and excluded from the sample. After applying the previous criteria, the final sample size for testing the incremental information content of: (i) cash flow from operations and earnings (Table 5-3), and (ii) cash flow from operations and working capital from operations (Table 5-4), for each year through the period of the study is as follows.

Final sample size of the study for testing the incremental information content of cash flow and earnings through the period of the study (1996 – 2002) is as follows.

Table 5-3 Final sample size of the study for testing the incremental information content of cash flow from operations and earnings

Year	Total sample size	Firms excluded due to non-availability of required data	Outliers	Final sample size
1996	1916	948	51	917
1997	1916	841	61	1014
1998	1916	808	58	1050
1999	1916	879	54	983
2000	1916	964	55	897
2001	1916	874	52	990
2002	1916	856	60	1000
Seven-year totals	13412	6170	391	6851

In terms of firm year observations, this sample comprises 6851 of firm year observations for a sample of 1634 British firms over 7 year periods from 1996 to 2002 for testing the incremental information content of cash flow from operations and earnings.

Final sample size of the study for testing the incremental information content of cash flow from operations and working capital from operations through the period of the study (1996 – 2002) is as follows:

Table 5- 4 Final sample size of the study for testing the incremental information content of cash flow from operations and working capital from operations

Year	Total sample size	Firms excluded due to non-availability of required data	Outliers	Final sample size
1996	1916	948	47	921
1997	1916	841	60	1015
1998	1916	808	55	1053
1999	1916	879	53	984
2000	1916	963	53	900
2001	1916	875	49	992
2002	1916	857	55	1004
Seven-year totals	13412	6171	372	6869

In terms of firm year observations, this sample comprises 6869 of firm year observations for a sample of 1634 British firms over 7 year periods from 1996 to 2002 for testing the incremental information content of working capital from operations and cash flow from operations.

5.4 Methodology for testing the incremental information content of earnings, working capital from operations, and cash flow from operations

The methodology of testing the incremental information earnings, working capital from operations, and cash flow from operations requires determining (i) the method of measuring the dependent variable, (ii) the method of measuring the independents variables, and (iii) the empirical models of testing the incremental information content of earnings, working capital from operations, and cash flow from operations.

5.4.1 Measuring the dependent variable and return window interval

Previous research on incremental information content of cash flow and accruals has employed liner regression models that relate unexpected share returns (abnormal returns) to unexpected amounts of cash flows from operations and accruals. Several issues are raised in the estimation of the unexpected amounts of share returns: (i) calculation of the return, (ii) the model which will be used to estimate the unexpected amounts of share returns (abnormal returns), and (iii) the return window interval.

5.4.1.1 Calculation of return

Share returns can be calculated by using a discrete returns formula or a logarithmic returns formula as follows.

Discrete returns formula

$$R_{it} = (P_{it} + D_{it} - P_{it-1}) / P_{it-1}$$

Logarithmic return formula

$$R_{it} = \text{Log} \{ (P_{it} + D_{it}) / P_{it-1} \}$$

Where:

R_{it} return for security i in period t

P_{it} the price of security i at the end of period t

P_{it-1} the price of security i at the end of period $t-1$

D_{it} dividends paid during period t

Log the logarithms to the base e (natural log)

It is generally agreed (Strong, 1992) a logarithmic formula is preferable to a discrete returns formula for theoretical and empirical reasons. Theoretically, logarithmic returns are analytically more traceable when accumulated over longer intervals to represent the sub-period returns (additive property); and, empirically, logarithmic returns are more likely to be normally distributed and thus conform to the assumptions of the regression analysis.

5.4.1.2 The estimation of abnormal return

Prior work on incremental information content of cash flow and accruals used unexpected share returns (abnormal returns) as a dependent variable in the regression model. Using the unexpected amount of share returns as a dependent variable in the regression model effectively removes the portion of return common to all securities of a given risk (the expected amount), leaving the individual firm component (the unexpected amount) for making the inference regarding the incremental information content of cash flow and accruals (Cheng et al., 1997).

The market model and the market-adjusted return model are the two prominent models used in incremental information content of cash flow and accruals studies. The market model abnormal return had been the most popular benchmark used in early studies of the incremental information content of cash flow and accruals (e.g., Schaefer & Kennelley, 1986; Wilson, 1986 & 1987; Rayburn, 1986; Bowen et al., 1987; Bernard & Stober, 1989; Livnat & Zarowin, 1990; Garrod & Hadi, 1998; Cheng et al., 1996; Board & Day, 1989; Board et

al., 1989). The estimation of the abnormal return by using the market model is established as follows (Kothari & Warner, 1997).

$$MM\ AR_{it} = R_{it} - \alpha_i - \beta_i R_{Mt}$$

Where:

$MM\ AR_{it}$ The monthly abnormal return for security i in month t

R_{it} The monthly return inclusive of dividends for security i in month t

R_{Mt} The monthly return on the value-weighted Index in month t

α_i and β_i are market model parameter estimates obtained by regressing monthly returns for security i on the equal-weighted monthly market returns over the 60-month estimation period (i.e., months - 60 to -1).

Recent work on incremental information content of cash flow and accruals has moved to use a market-adjusted return model to estimate security-specific abnormal returns (e.g., Ali, 1994; Ali & Pope, 1995; Pfeiffer et al., 1998; Pfeiffer & Elgers, 1999; Cheng & Yang; 2003).The estimation of the abnormal return by using the market -adjusted return model is as follows (Kothari & Warner, 1997).

$$MMA\ R_{it} = R_{it} - R_{mt}$$

Where

$MM\ AR_{it}$ The abnormal return for security i in period t

R_{it} The return inclusive of dividends for security i in period t

R_{Mt} The return on the value-weighted Index in period t

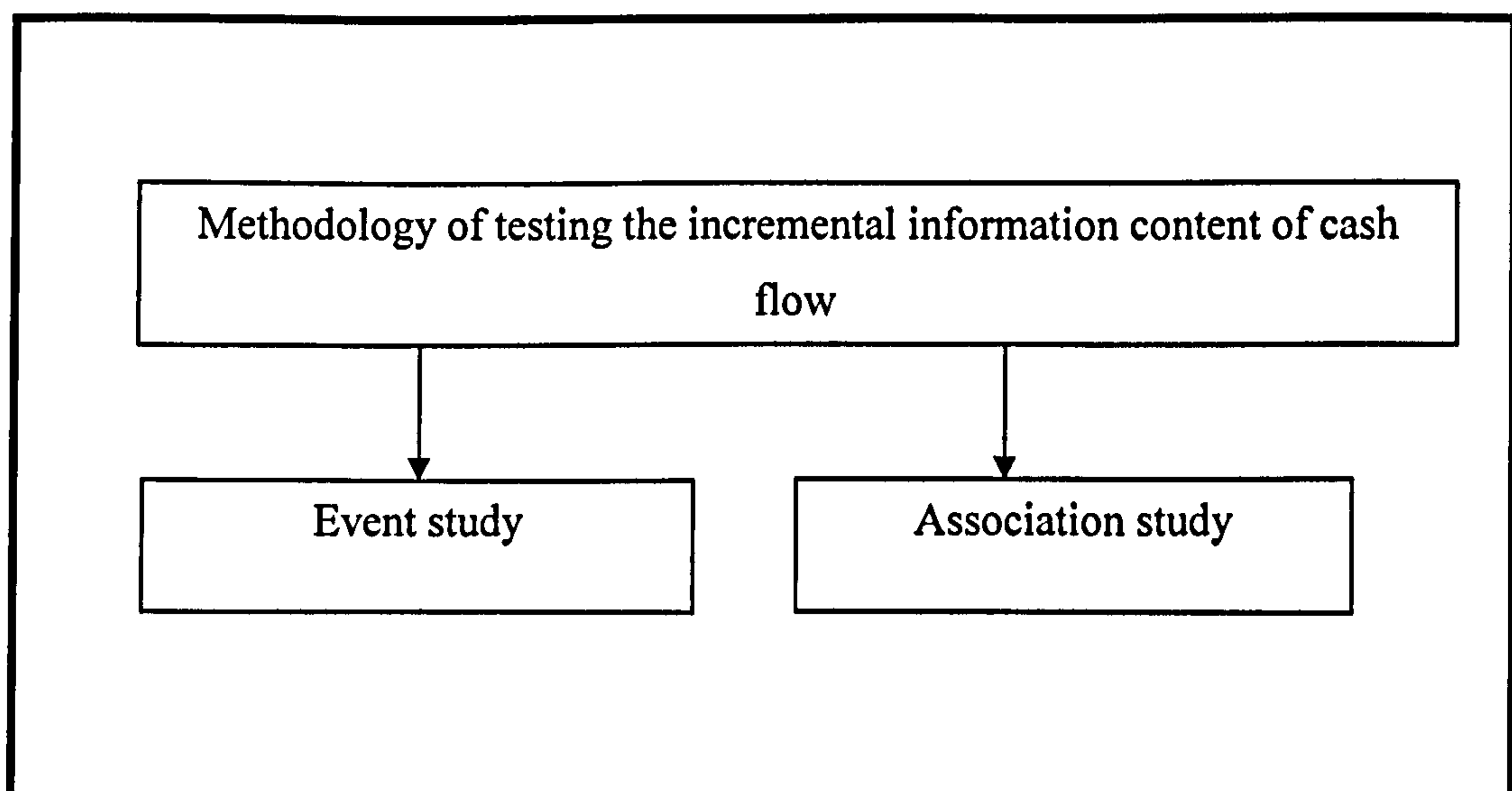
Using the market-adjusted return model to estimate security-specific abnormal returns instead of market model abnormal return avoids the estimation problem in market model parameters. In addition, Brown and Warner (1980) found that in many cases a simpler method which does not explicitly adjust for marketwide

factors or for risk, such as the market-adjusted return model, provides similar results in comparison with the market model for estimating abnormal returns.

5.4.1.3 Return window interval

As shown before, studies on the incremental information content of cash flow and accruals have been conducted to investigate the potential of cash flow to complement earnings in explaining security returns. These set of studies have been investigated by using either an association study methodology or an event study methodology. Association studies methodology makes the inference regarding the incremental information content of cash flow by observing the relation between abnormal share returns and both cash flow and accruals over a long period (e.g., in the U.S., Beaver et al., 1982; Schaefer & Kenneley, 1986; Rayburn, 1986; Bowen et al., 1987; Livnat & Zarowin, 1990; Ali, 1994; Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang, 2003; in the U.K., Board & Day, 1989; Board et al., 1989; Ali & Pope, 1995; Garrod & Hadi 1998; Green, 1999; Charitou et al., 2001). Event study methodology evaluates the incremental information content of cash flow via an examination of the market reaction to firms' disclosures of the cash flow information (e.g., Wilson, 1986 & 1987; Bernard & Stober, 1989). Figure 5-1 depicts the methodology of testing the incremental information of cash flow.

Figure 5-1 Methodology of testing the incremental information content of cash flow



Bowen et al. (1987) presented the following reasons for the superiority of association study methodology over event study methodology for providing a proper judgment in respect of the incremental information of cash flow data.

1. The new cash flow information is likely to become available to the market throughout the year.
2. A daily or weekly return window following the annual earnings announcement may be unable to detect incremental information from cash flow data merely because of the accrual data "trickle" into the public domain until the official release of the annual report.

Based on the previous reasons and following recent work in this area, the current study employs an association study methodology to investigate the incremental information content of earnings, working capital from operations, and cash flow from operations.

Following the same methodology of the association study of earnings return relationships, the incremental information content of cash flow and accruals studies use a lagged return window as an attempt to best match the share returns with the period over which the accounting information relating to accounting earnings and cash flows is potentially to be disclosed in the annual report (Garrod & Hadi, 1998).

U.S. studies utilized a three month lag period (e.g., Bowen et al., 1987; Livnat & Zarowin, 1990; Ali, 1994; Cheng et al., 1996; Pfeiffer et al., 1998; Pfeiffer & Elgers, 1999; Cheng & Yang, 2003). These U.S. studies assumed that all annual reports are disclosed to the market by the end of the third month after the year end.

U.K. studies have used a four month lag period, Strong & Walker (1993), in their study of the relationship between earnings and return, computed the annual abnormal return for the period from May of year t to April of year $t+1$. On this base they assumed that annual reports are disclosed to the market by the end of the fourth month after the year end. The same procedure has been conducted by

Ali & Pope (1994)²⁰⁵ in their investigation to the incremental information of earnings, working capital from operations and cash flow from operations. Garrod & Hadi (1998) reported a higher R^2 for the four month lag period than five or six months. Moreover, as a confirmation of this previous assumption, using a lagged return window of four months in the U.K. market, Green (1999) found that 90% from the firms of the sample of his study on the incremental information of cash flow and earnings released their financial statements within four months from the fiscal year-end.

Based on the previous discussion (for the calculation of return, the estimation of abnormal return, and return window interval) and assuming that equity markets are (semi-strong) efficient, forward-looking and can form estimates for performance measures (Biddle et al. 1997), this study employs an association study methodology over one year (an annual return window) and uses market-adjusted return model for computing the abnormal return. The annual market-adjusted return is measured over the 12-month period beginning on the fifth month of each fiscal year-end, assuming that U.K. Listed firms have to release their financial statements within four months from the fiscal year-end (a four month lag period). The annual market-adjusted return is defined as the difference between the annual raw return for firm i , measured over the 12-month period beginning on the fifth month of each fiscal year-end (a four month lag period), and annual share return on Financial Times All Share Index (FTALLSH), measured over the 12-month period beginning on the fifth month of each fiscal year-end (a four month lag period).

²⁰⁵ Also in this study, Ali & Pope (1994) used a lagged return window of six months assuming that all annual reports are disclosed to the market by the end of the sixth month after the year end. The results did not, however, show any difference between using a lagged return window of four months and six months.

Annual share returns for each firm is calculated as follows²⁰⁶.

$$R_{it} = \text{Log} (RI_{it} / RI_{it-1})$$

Where

- R_{it} Annual share return for firm i in the fiscal year end (t)
- RI_{it} Return Index for firm i in the end of the fourth month of each fiscal year end (t)
- RI_{it-1} Return Index for firm i in the end of fourth month of each fiscal year end ($t-1$)

Annual returns on Financial Times All Share Index (FTALLSH) are calculated as follows:

$$R_{mt} = \text{Log} (RI_{mt} / RI_{mt-1})$$

Where

- R_{mt} Annual share return on the Financial Times All Share Index (FTALLSH) in the fiscal year end (t)
- RI_{mt} Return Index on Financial Times All Share Index (FTALLSH) at the end of the fourth month of each fiscal year end (t)
- RI_{mt-1} Return Index on Financial Times All Share Index (FTALLSH) at the end of the fourth month of each fiscal year end ($t-1$)

²⁰⁶ DataStream Return Index (RI) is used to calculate the returns instead of share price because it is adjusted for dividends and capital actions such as share repurchases and share splits.

The estimation of the abnormal return by using the market -adjusted return model is as follows:

$$MA R_{it} = R_{it} - R_{mt}$$

Where

$MA R_{it}$ The annual market-adjusted returns for firm i .

R_{it} Annual share return for firm i in the fiscal year end (t)

R_{mt} Annual share return on Financial Times All Share Index (FTALLSH) in the fiscal year end (t)

5.4.2 Measuring the independent variables

Market-based accounting research (MBAR) that correlates financial statement information with security returns frequently uses a model of expected earnings to isolate the surprise component of earnings from the anticipated component (Kothari, 2001). Prior work on the incremental information content of cash flow and accruals used the unexpected components of cash flow and accruals as independent variables in the regression model. There are at least two reasons for using the unexpected components of cash flow and accruals. First, only accruals and cash flow surprise provide new information because the market can expect a certain level of performance for cash flow and accruals (Green, 1999). Second,

"In an efficient capital market the anticipated component is uncorrelated with future returns ... Any anticipated component that smears the estimated proxy for the surprise component of earnings serves as noise or measurement error in the proxy and weakens the estimated return-earnings association. Thus, the degree of return-earnings association hinges critically on the accuracy of the unexpected earnings" (Kothari, 2001, P. 144).

There have been three common methods²⁰⁷ used in prior studies of the information content of earnings as proxies for estimating the unexpected

²⁰⁷ For other methods used as proxies for the unexpected components of earnings see a review article by Williams (1995).

components of earnings. These three methods are (Biddle et. al., 1994) (i) analysts' forecasts, (ii) ARIMA time-series models, and (iii) the random walk model. Both analysts' forecasts and ARIMA time-series models have limitations. Analysts' forecasts are not always available on a timely basis and are only marginally superior to ARIMA time-series models. On the other hand, ARIMA time-series models need a long estimation period and do not take into account the other information available to the market (Biddle et al., 1995). The random walk model has been prominent because it provides very similar results to time-series models and avoids the parameter estimation problem of ARIMA time-series models (See Ball & Watts, 1972). In addition, the random walk model is a reasonable description of the time-series properties of annual earnings (Kothari, 2001).

As with the information content of earnings studies, the majority of early studies on incremental information content of cash flow and accruals used the random walk model²⁰⁸ for estimating the unexpected components of cash flow and accruals (e.g., Kennelley, 1986; Rayburn, 1986; Bowen et. al., 1987; Livnat & Zarowin, 1990; Cheng et al., 1996; Board & Day 1989; Board et al., 1989; Garrod & Hadi, 1998). Several studies have used time-series models for estimating the unexpected components of cash flow and accrual (e.g, Rayburn, 1986; Wilson, 1987).

Along the lines of recent works on earnings return relation, contemporaneous work on the incremental information content of cash flow and earnings employed both the change and the level of cash flow and earnings as proxies for their unexpected amounts (e.g., in the U.S. see, Cheng et al., 1996; Cheng & Yang, 2003; in the U.K., Ali & Pope, 1995; Charitou et al., 2001). The reason for using both the level and change as proxies to the unexpected amounts of cash flow and earnings is to reduce the measurement error when cash flow and earnings contain extreme (transitory) components²⁰⁹.

²⁰⁸ According to the random walk model, the unexpected amount of the variable in a specific year is the change in the variable between two consecutive years (the change in the variable = the amount of the variable in this year – the amount of the variable in the previous year).

²⁰⁹ See Chapter 3, section 3.4.2 for discussion of the reasons for including both the change and the level of earnings in earnings return relation. Also, for the justification and demonstration for using the level and change in earnings and cash flow from operations (when they both consist of

Biddle et al. (1995) argued that "Accounting measures other than earnings, analysts' forecasts are generally not available, and little evidence exists on the appropriateness of time-series proxies for market expectations" (P. 7). To address the lack of suitable proxies for market expectations for accounting measures other than earnings, Biddle et al. (1995, 1997) used the one-lag specification as a proxy for the unexpected components of the variables considered in their study²¹⁰. According to Biddle et al. (1997) "The one-lag specification is equivalent to the level and change specification proposed by Easton & Harris (1991)" (Biddle et al, 1997, P.309).

Based on the previous discussion, this study employs the change and the level of (i) earnings, (ii) working capital from operations, and (iii) cash flow from operations for measuring their unexpected amounts (See the level and change combined model later in this chapter) for the following reasons.

1. This procedure is consistent with the most recent studies on the incremental information of cash flow and accruals.
2. Changes in earnings, working capital from operations, and cash flow from operations are unlikely to persist to be permanent for all the firms in the sample of the study²¹¹.
3. A little is known about suitable proxies for market expectations for working capital from operations and cash flow from operations (Biddle et al., 1997)²¹².

a mixture of persistent and transitory components) as proxies for their unexpected amounts, see Cheng & Yang's (2003) Appendix A.

²¹⁰ In the one-lag specification, the level of the variable in the current year and the level of the variable in the previous year (the first lag of the variable) are used as a proxy for the unexpected components of the variable.

²¹¹ For the justification and demonstration for using the level and change in a given accounting variable (when this variable consists of a mixture of persistent and transitory components) as proxy for its unexpected amount, see Cheng & Yang's (2003) Appendix A.

²¹² Because little has been known about suitable proxies for market expectations other than earnings, Biddle et al. (1997) used the one-lag specification to examine the relative information content for four variables. These four variables were as follows: operating cash flow (CFO), earnings before extraordinary items (EBEI), residual income (RI), and economic value added (EVA). For the same reason, they used the one-lag specification to examine the incremental information content of five components of economic value added. These five components were: operating cash flow, operating accrual, after-tax cost of interest expense, the cost of all debt and equity capital employed, and Stern Stewart adjustments to accounting measures of operating profits and capital.

5.4.3 Empirical models and research hypotheses

The standard approach to assessing the incremental information content of earnings, working capital from operations, and cash flow and earnings is to examine the statistical significance of the slope coefficients, by using the standard t test on each coefficient, in the following ordinary-least squares (OLS) regression²¹³:

$$RET_{it} = \alpha_{0t} + \alpha_{1t} UE_{it} + \alpha_{2t} UWFO_{it} + \alpha_{3t} UCFO_{it} + U_{it}$$

Where, RET_{it} is the abnormal stock returns²¹⁴ of firm i in period t . UE_{it} is the unexpected earnings²¹⁵, $UWFO_{it}$ is the unexpected working capital from operations, and $UCFO_{it}$ is the unexpected cash flow from operations. U_{it} is the error term. A positive and significant α_{1t} implies that earnings have incremental information content (non-current accruals are informative component of earnings). A positive and significant α_{2t} implies that working capital from operations from operations has incremental information content (current accruals are more highly valued than non-current accruals). A positive and significant α_{3t} implies that cash flow from operations has incremental information content (cash flow from operations is more highly valued than current accruals). The interpretation of the results of this model is as follows.

"A positive coefficient on cash flows from operations implies that the market responds more favorably to cash flow than to current accruals, possibly because accruals are subject to manipulation and high liquidity signals financial prosperity. A positive coefficient on working from operations implies that the market responds more favorably to current accruals than to non-current accruals, possibly because non-current accruals (e.g., depreciation) are only indirectly linked to future cash flows. A positive coefficient on earnings implies that non-current accruals have incremental information content beyond that contained in cash flows and current accruals" (Ali, 1994, P. 63).

²¹³ In the above model, the implied market response to unexpected amounts of earnings components (non-current accruals, current accruals, and cash flow from operations) is α_{1t} for non-current accruals, $(\alpha_{1t} + \alpha_{2t})$ for current accruals, and $(\alpha_{1t} + \alpha_{2t} + \alpha_{3t})$ for cash flow from operations. For more details of the demonstration of these relations see, Jennings (1990).

²¹⁴ For more details of the methods of measuring the abnormal return, see section 5.4.1. in this chapter.

²¹⁵ For more details of the methods of measuring the unexpected amounts of earnings, working capital from operations and cash flow from operations see section, 5.4.2. in this chapter.

Bowen et al. (1987) examined the incremental information content of cash flow variables, cash flow from operations and cash flow after investment, as a group and the accrual variables, earnings and working capital from operations, as a group by using F-tests (by employing restricted regression techniques) for a group of variables due to the difficulty of interpreting the significance levels of individual regression coefficients in the presence of highly collinear independent variables (Neill et al., 1991).

The interpretation of the results of the previous model in terms of the composition and disclosure of earnings depends on the other independent (conditioning) variables included in the estimated equation (Jennings, 1990). Thus alternatively, the incremental information content of earnings, working capital from operations, and cash flow from operations variables can be examined by regressing abnormal returns on (i) unexpected cash flow from operations, (ii) unexpected current accruals, and (iii) unexpected non-current accruals and test whether: (a) any of the coefficients are nonzero provide evidence whether the variables have incremental information content beyond each other, and (b) various coefficients are the same provide evidence for evaluating the separate disclosures of earnings components²¹⁶. On this basis, different versions of the previous model have been used in the literature to evaluate the disclosures of earnings components. For example, based upon that

²¹⁶ When set up the regression equation in this alternative specification (via regressing abnormal returns on (i) unexpected cash flow from operations, (ii) unexpected current accruals, and (iii) unexpected non-current accruals), test whether (in the form of the null hypotheses) (a) the coefficient on cash flow = the coefficient on current accruals; this test examines whether cash flow and current accruals are valued differently (associated with returns differently from each other), (b) the coefficient on current accruals = the coefficient on non-current accruals; this test examines whether current accrual and non-current accruals are valued differently, and (c) the coefficient on non-current accruals = 0; this test examines whether non-current accruals represents informative component of earnings. These tests can be conducted directly by observing the statistical significance of the slope coefficients obtained from regressing abnormal returns on (i) earnings, (ii) working capital from operations, and (iii) cash flow from operations. On the other hand, it has been widely documented that all three components of earnings: (i) cash flow from operations, (ii) current accruals, and (iii) non-current accruals are informative where the coefficient on any one of them, in this alternative regression specification, is nonzero, this means that the inclusion of each component adds to the informativeness of earnings (see for example, Rayburn, 1986; Bowen et al., 1987; Jennings, 1990; Pfeiffer & Elgers, 1999). In this alternative regression specification, the implied market response to unexpected amounts of (i) earnings is the coefficient on non-current accruals, (ii) working capital from operations is the coefficient on current accruals – the coefficient on non-current accruals, and (iii) cash flow from operations is the coefficient on cash flow from operations – the coefficient on current accruals. For more details about the demonstration of these relations see, Jennings (1990).

cash flow and total accruals are complementary with respect to earnings some studies examined the differential valuations of cash flow from operations and total accrual (e.g, Rayburn, 1986, Jennings, 1990). Further divisions of total accruals into non-current accruals and current accruals have also been analysed to examine the securities market's differential pricing of earnings components: (i) cash flow from operations, (ii) current accruals, and (iii) non-current accruals (e.g., Rayburn, 1986; Wilson, 1987; Pfeiffer & Elgers, 1999).

Recent research that examined the incremental information of cash flow and earnings (e.g., Cheng et al., 1996; Cheng et al., 1997; Charitou et al., 2001; Cheng & Yang, 2003; and among others) employed both change and level of cash flow and earnings as proxies for their unexpected amounts²¹⁷. Brown et al. (1987) and Ali & Zarowin (1992 B) have shown that if the level and the change variables are taken together as proxies for measuring the unexpected amount of the variable, then the sum of the slope coefficients on the change and level variables is an estimate of the slope coefficient of the unexpected amount of the variable²¹⁸. Hence in the level and change combined model, assessing the incremental information content of cash flow and earnings can be performed via examining the statistical significance of the sum of the two slope coefficients on the level and changes variables in the following ordinary-least squares (OLS) regression.

$$RET_{it} = \alpha_{0t} + \alpha_{1t} UE_{it} + \alpha_{2t} UCFO_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CFO_{it} + U_{it}$$

Where, RET_{it} is the abnormal stock returns of firm i in period t . UE_{it} is the change in earnings, and $UCFO_{it}$ is change in cash flow from operations. E_{it}

²¹⁷ For the motivation of using the change and the level of earnings in earnings return relation, see chapter 3, section 3.4.2. Also, see section 5.4.2. in this chapter. Also, for the justification for and demonstration of using the level and change in earnings and cash flow from operations (when they both consist of a mixture of persistent and transitory components) as proxies for their unexpected amounts, see Cheng & Yang's (2003) Appendix A.

²¹⁸ For more details of t statistics for the sum of coefficients see, Wald test in:

- (1) Maddala, G. S., (2001). Introduction to Econometrics. 3rd ed. New York, John Wiley & Sons, Ltd.
- (2) Kennedy, Peter, (2003). A Guide to Econometrics. 5th ed. Cambridge, The MIT Press.
- (3) Greene, William, H., (2003). Econometrics Analysis. 5th ed. New Jersey, Upper Saddle River.

is the level of earnings and CFO_{it} is the level of cash flow from operation. U_{it} is the error term.

In the previous model, positive and significant $(\alpha_{1t} + \alpha_{3t})^{219}$ implies that earnings have incremental information content beyond cash from operations (total accruals are informative component of earnings). Positive and significant $(\alpha_{2t} + \alpha_{4t})$ implies that cash flow from operations have incremental information content beyond earnings (cash flow from operations is more highly valued than total accruals).

Biddle et al. (1994, 1995, and 1997) presented the following model for assessing the incremental information for any given number of measures. For example if we investigate the incremental information content of cash flow from operations and earnings (two variables), the model will be as follows.

$$RET_{it} = \alpha_{0t} + \alpha_{1t} X_{it} + \alpha_{2t} X_{it-1} + \alpha_{3t} Y_{it} + \alpha_{4t} Y_{it-1} + U_{it}$$

Where, RET_{it} is the abnormal stock returns of firm i in period t . X_{it} is the level of earnings and X_{it-1} is the first lag of earnings (the level of the earnings in the previous period). Y_{it} is the level of cash flow from operations and Y_{it-1} is the first lag of cash flow from operations (the level of cash flow from operation in the previous period). In this model, the incremental information content is assessed by using *t-tests* on individual coefficients and F-tests of the joint null hypotheses (Biddle et al., 1994, 1995, 1997) as follows (in the form of the null hypotheses).

For testing the incremental information content of earnings:

$$H_0: \alpha_{1t} = \alpha_{2t} = 0$$

²¹⁹ *t* statistics for sum of two coefficients $(\alpha_{1t} + \alpha_{3t})$, for example, Computed $T = \text{sum } (\alpha_{1t} + \alpha_{3t}) / \text{the square root of } \{(\text{Variance of } \alpha_{1t} + \text{variance of } \alpha_{3t}) - 2 \text{ Covariance of } (\alpha_{1t}, \alpha_{3t})\}$. Where tabulated T is obtained by determined significant level with $(N - K)$ degrees of freedom: N = the total number of observations and K = the number of right-hand side regressors in the equation of the regression. See Wald test in Maddala (2001), Kennedy (2003), and Greene (2003). These statistical operations have been performed directly by using EViews econometric software version 5.

For testing the incremental information content of cash flow from operations

$$H_0: \alpha_{3t} = \alpha_{4t} = 0$$

The previous one-lag version model is equivalent to the level and change combined model, mentioned above²²⁰.

The empirical work in this study is conducted in two separate stages²²¹. First, it examines the incremental information content of earnings and cash flow from operations followed by examining the effect of extreme earnings on the incremental information content of cash flow and earnings. Second, it examines the incremental information content of working capital from operations and cash flow from operations followed by examining the effect of extreme working capital from operations on the incremental information content of cash flow and working capital from operations. The following four models are estimated for each stage separately.

Based on the previous discussion for the empirical models and consistent with recent research, this study employs the level and change combined model²²² (model 2) to examine the incremental information content of earnings and cash flow from operations, then the incremental information content of working capital from operations and cash flow from operations. However, in order to provide a performance benchmark for the level and change combined model, this study employs also the change model (random walk model)²²³ (model 1). Furthermore, and as indicated in the introduction to this study, the study investigates the effect of the extremity of earnings on the incremental information content of cash flow from operations, and then the effect of the extremity of working capital from operations on the

²²⁰ For more details about the equivalence between the level and change combined model and the one lag specification model, see Biddle et al., (1994, 1995, and 1997)

²²¹ For the rationale for conducting these two separate stages, see research problem and contribution of this study in chapter 1.

²²² For the justification for and demonstration of using the level and change in a given accounting variable (when this variable consists of a mixture of persistent and transitory components) as proxy for its unexpected amount, see Cheng & Yang's (2003) Appendix A.

²²³ In change model (random walk model) the unexpected amount of each independent variable in a specific year is the change in the variable between two consecutive years (the change in the variable = the amount of the variable in this year – the amount of the variable in the previous year).

incremental information content of cash flow from operations. Following Cheng & Yang (2003), further analysis for the issue of the effect of extreme earnings on the incremental information content of cash flow, then and as extension to Cheng & Yang (2003) the effect of extreme working capital from operations on the incremental information of cash flow has focused on the level and change combined model by employing contextual models with a dummy variable approach for measuring the effect of the extremity (See Model 3 & Model 4 later in this chapter)²²⁴.

5.4.3.1 Change model (model 1) and change and level combined model (model 2)

Change model (model 1) and change and level combined model (model 2) are employed for testing the following hypotheses:

A. In the case of testing the incremental information content of cash flow and earnings (in the first stage)

Recent U.S. work examined the incremental information content of cash flow and earnings provide significant results for the incremental information of cash flow beyond that contained in earnings (Cheng et al., 1996; Cheng et al., 1997; Pfeiffer et al. 1998; Pfeiffer & Elgers 1999; Cheng & Yang 2003). To date in the U.K., almost all studies that examined the incremental information content of cash flow beyond earnings and working capital from operations (see for example, Board & Day, 1989; Board et al., 1989; Ali & Pope, 1994 & 1995; Green, 1999) or only beyond earnings (e.g., Charitou et al., 2001) have failed to prove or provided only limited support or mixed and inconclusive results for the incremental information content of cash flow from operations similar to the recent U.S. studies.

Following recent U.S. & U.K work (e.g., Cheng et al., 1996; Charitou et al., 2001; Cheng & Yang, 2003) on the incremental information content of cash flow and earnings and based upon (i) the mixed results of the previous U.K. research on incremental information content of cash flow and earnings, (ii) the large

²²⁴ The explanation for these four models is given next.

sample size in this study and the more recent period, and (iii) actual numbers of cash flow as shown in cash flow statement in contrast to most of the previous studies which relied on estimates of cash flows numbers²²⁵, this study addresses the following hypotheses again in the U.K. market to provide conclusive results for the incremental information content of cash flow beyond earnings.

- **Earnings have incremental information content beyond that contained in cash flow from operations.**
- **Cash flow from operations has incremental information content beyond that contained in earnings.**

The previous hypotheses represent an examination to the market differential pricing of cash flow from operations and total accruals.

B. In the case of testing the incremental information content of cash from operations and working capital from operations (in the second stage)

Research on the incremental information content of cash flow and accruals information is primarily concerned with the issue of the relative valuation of cash flow and accruals components of earnings i.e., operating cash flow, current accruals, and non-current accruals. This is to assess whether disaggregated disclosures are more informative to investors than aggregated disclosure. The first stage that examines the incremental information content of cash flow from operations only beyond earnings, similar to recent U.S. studies, tests whether cash flow from operations and total accruals, as a whole, are associated with returns differently. Examining the differential valuation of cash flow and total accruals does not answer whether separate disclosure of total accrual components (non-current accruals, and current accruals) is informative and leads to (i) embedding non-cash movements in assets and liabilities (such as change in receivables, inventories, etc) (current accruals), which constitutes a unique and informative part from earnings and contains value-relevant information present in accounting earnings, with non-current accruals in one component, and (ii) giving cash flow from operations the opportunity to have

²²⁵ See data collection and sample selection in this chapter section 5.3.

higher valuation over total accruals not because it has higher valuation than current accruals, but because it is correlated with working capital from operations which is omitted. Evidence on the securities market's higher pricing of cash flow from operations over total accruals do not necessarily hold with respect to assessing the differential higher valuations of cash flow from operations over current accruals. The research literature indicates (i) a higher valuation of both current accruals and cash flow from operations than non-current accruals (this issue has been widely documented see for example Rayburn, 1986; Wilson, 1986 & 1987; Pfeiffer et al., 1998; Pfeiffer & Elgers, 1999), and (ii) weak evidence on the differential higher valuations of cash flow over current accruals (e.g., Bernard & Stober, 1989; Jennings, 1990; Ali, 1994; Ali & Pope, 1995; Pfeiffer et al., 1998²²⁶; Green 1999), the second stage therefore assesses the generality of recent U.S. findings that examined the incremental information content of cash flow from operations only beyond earnings by examining the incremental information content of cash flow from operations beyond working capital from operations to identify whether cash flow from operations and current accruals are valued differently. Hence, to see whether disaggregated disclosures of working capital from operations into its components; cash flow from operations and current accruals is more informative.

To address the above issue, this study tests the incremental information content of cash flow from operations beyond working capital from operations. This lead to the following testable hypotheses²²⁷:

- **Working capital from operations has incremental information content beyond that contained in cash flow from operations.**
- **Cash flow from operations has incremental information content beyond that contained in working capital from operations.**

²²⁶ Pfeiffer et al., (1998) reported a statistically significant differential valuation of cash flow and current accruals when they employed pooled cross-sectional and time series data for estimating surprises in earnings, working capital from operations, and cash flow from operations.

²²⁷ For more details regarding the motivation of these hypotheses and for more details of the criticism of examining the incremental information content of cash flow from operations only beyond earnings and not beyond both earnings, and working capital from operations, see chapter 1, section 1.2.

The previous hypotheses represent an examination of the market differential pricing of cash flow from operations and current accruals.

Change model (model 1) and change and level combined model (model 2) can be presented as follows.

Change model: (Model 1)

The change model (Model 1) is set up as follows.

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \varepsilon_{it}$$

Where

- R_{it} is the annual market adjusted stock returns of firm i measured over the fifth month of year t to the fourth month of year $t+1$.
- A. In the case of testing the incremental information content of cash flow and earnings (in the first stage):**
 - ΔE_{it} is the change in earnings and ΔCF_{it} is the change in cash flow from operations for firm i in year t . Earnings and cash flow are deflated by the market value of equity at the beginning of year t as suggested by Christie (1987) to reduce the potential problems of heteroskedasticity.
- B. In the case of testing the incremental information content of cash from operations and working capital from operations (in the second stage):**
 - ΔE_{it} is the change in working capital from operations and ΔCF_{it} is the change in cash flow from operations for firm i in year t . Working capital from operations and cash flow are deflated by the market value of equity at the beginning of year t as suggested by Christie (1987) to reduce the potential problems of heteroskedasticity.

This study hypothesises positive and significant values for α_{1t} and α_{2t} .

$$H_0: \alpha_{1t} = 0 \quad \& \quad \alpha_{2t} = 0$$

$$H_a: \alpha_{1t} > 0 \quad \& \quad \alpha_{2t} > 0$$

In the case of testing the incremental information content of cash flow from operations and earnings, a positive and significant value of α_{1t} implies earnings have incremental information beyond that contained in cash flow from operations. A positive and significant value of α_{2t} implies that cash flow from operations has incremental information beyond that contained in earnings.

In the case of testing the incremental information content of cash flow from operations and working capital from operations, a positive and significant value of α_{1t} implies working capital from operations has incremental information beyond that contained in cash flow from operations. A positive and significant value of α_{2t} implies that cash flow from operations has incremental information beyond that contained in working capital from operations.

Level and change combined model: (Model 2)²²⁸

The level and change combined model (Model 2) is set up as follows.

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \varepsilon_{it}$$

Where

- R_{it} is the annual market adjusted stock return of firm i measured over the fifth month of year t to the fourth month of year $t+1$.
- A. in the case of testing the incremental information content of cash flow from operations and earnings (in the first stage):**
 - ΔE_{it} (E_{it}) is the change (level) in earnings and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm i in year t . Change and level of earnings and cash flow are deflated by the market value of equity at the beginning of year t as suggested by Christie (1987) to reduce the potential problems of heteroskedasticity.
 - Sum of $(\alpha_1 + \alpha_3)$ is the sum of the estimated coefficients of the change and level of earnings.

²²⁸ As stated before in this section, testing of significance for sum of two coefficients jointly has been performed by using a Wald test of joint significance.

- Sum of $(\alpha_2+\alpha_4)$ is the sum of the estimated coefficients of the change and level of the cash flow from operations.

B. In the case of testing the incremental information content of cash from operations and working capital from operations (in the second stage):

- ΔE_{it} (E_{it}) is the change (level) in working capital from operations and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm i in year t . Change and level of working capital from operations and cash flow from operations are deflated by the market value of equity at the beginning of year t as suggested by Christie (1987) to reduce the potential problems of heteroskedasticity.
- Sum of $(\alpha_1+\alpha_3)$ is the sum of the estimated coefficients of the change and level of working capital from operations.
- Sum of $(\alpha_2+\alpha_4)$ is the sum of the estimated coefficients of the change and level of the cash flow from operations.

This study hypothesizes positive and significant values for Sum of $(\alpha_1+\alpha_3)$ and $(\alpha_2+\alpha_4)$.

$$H_0: (\alpha_1+\alpha_3) = 0 \quad \& \quad (\alpha_2+\alpha_4) = 0$$

$$H_a: (\alpha_1+\alpha_3) > 0 \quad \& \quad (\alpha_2+\alpha_4) > 0$$

In the case of testing the incremental information content of cash flow from operations and earnings, a positive and significant value of $(\alpha_1+\alpha_3)$ implies that earnings have incremental information beyond that contained in cash flow from operations. A positive and significant value of $(\alpha_2+\alpha_4)$ implies that cash flow from operations has incremental information beyond that contained in earnings.

In the case of testing the incremental information content of cash flow from operations and working capital from operations, a positive and significant value of $(\alpha_1+\alpha_3)$ implies that working capital from operations has incremental information beyond that contained in cash flow from operations. A positive and significant value of $(\alpha_2+\alpha_4)$ implies that cash flow from operations has

incremental information beyond that contained in working capital from operations.

5.4.3.2 Contextual models with a dummy variable approach: measuring the effect of the extremity²²⁹ (Model 3 and Model 4):

Contextual models with a dummy variable approach (Model 3 & Model 4) are employed to test the following hypotheses.

A. In the case of testing the effect of the extremity of earnings on the incremental information content of cash flow and earnings (in the first stage):

Many studies have documented that moderate earnings have more information content than extreme earnings²³⁰ (e.g., in the U.S., Freeman & Tes, 1992; Ali & Zarowin, 1992 A; Ali & Zarowin, 1992 B; in the U.K., O'Hanlon et al., 1992; Donnelly & Walker, 1995)²³¹. In general, research on the incremental information content of cash flow from operations and earnings have reported mixed and inconclusive results regarding the incremental information content of cash flow from operations. However, some other studies have found incremental information content for cash flow from operations when earnings are extreme (Cheng et al., 1996; Cheng & Yang, 2003). This is because, when earnings have less information content, the market will look for another measure which has more information content and the good surrogate measure for earnings when earnings are extreme is cash flow from operation (Cheng & Yang, 2003). In addition, other studies have reported that moderate cash flow has more incremental information content than extreme cash flow (Ali, 1994)²³².

Cheng et al. (1996) examined the incremental information content of cash flow from operations and earnings when earnings are extreme but they do not control

²²⁹ For discussion of the effect and measuring of extreme (transitory) components and moderate (permanent) components of earnings, see chapter 3, section: 3.4.2. For this point, also see chapter 4, section 4.3.2.

²³⁰ In this study and following Cheng & Yang (2003) the terms moderate and permanent and the terms extreme and transitory are used interchangeably. For more details of these terms and its implications for market based accounting research (MBAR) studies, see chapter 3, section 3.4.2.

²³¹ For more details about this issue, see chapter 3, section 3.4.2.

²³² For more details of these studies, see chapter 4, section 4.3.2.

for the extremity of cash flow itself²³³. Ali (1994) tested the incremental information content of cash flow in the presence of its extremity but he does not control for the extremity of earnings²³⁴. Unlike Ali (1994) and Cheng et al. (1996), Cheng & Yang (2003) investigated the effect of the extremity of earnings on the incremental information content of cash flow from operations and earnings, and also they controlled for the extremity of cash flow from operations itself²³⁵. This is because the incremental information content of cash flow from operations when earnings are extreme is being affected by cash flow extremity as well. They found that the effect of extreme earnings lead to incremental information content only for moderate cash flow and not for extreme cash flow.

In respect of testing the effect of the earnings extremity on the incremental information content of cash flow from operations and earnings, this study follows the same methodology of Cheng & Yang (2003) for testing the effect of the extremity of earnings on the incremental information content of cash flow from operations and earnings²³⁶. Following Cheng & Yang (2003), this study expects that when earnings are extreme the incremental information content of cash flows will be conditioned on its extremity. In other words, even if earnings are extreme, the incremental information content of cash flow does not exist for the extreme cash flow from operations. It exists only for moderate cash flow from operations and not for the extreme cash flow from operations.

In the light of the above discussion and following the study of Cheng & Yang (2003) in the U.S., this study address the following hypothesis in the U.K. market

²³³ In other words, Cheng et al. (1996) did not isolate extreme cash flow apart from moderate ones when they examined the effects of extreme earnings on the incremental information content of cash flow and earnings.

²³⁴ In other words, Ali (1994) did not examine the effects of extreme earnings on the incremental information content of cash flow and earnings.

²³⁵ This means that this study isolated extreme cash flow apart from moderate ones when examining the effects of extreme earnings on the incremental information content of cash flow and earnings.

²³⁶ Unlike Cheng & Yang (2003), this study does not investigate the effect of the extremity of cash flow from operations on the incremental information content of cash flow from operations and earnings. This is because, earnings are the primary profitability measure and cash flow from operations is the secondary profitability measure. When earnings have less information content the market will look for another measure which has more information content and cash flow from operation is a good surrogate for earnings. When cash flow is extreme and has less information content, the market will depend upon the primary profitability measure which is earnings irrespective of earnings itself are extreme or moderate.

to provide comparative results regarding the effect of the earnings extremity on the incremental information content of cash flow from operations and earnings.

- **When earnings are extreme the incremental information content of cash flow from operations exists only for moderate cash flow and not for extreme cash flow.**

B. In the case of testing the effect of the extremity of working capital from operations on the incremental information content of cash flow and working capital from operations (in the second stage):

Consistent with the recent studies (Cheng et al., 1996; Cheng & Yang, 2003) that have examined the effect of extreme earnings on the incremental information content of cash flow from operations and earnings, the study here seeks to extend the U.S. study of Cheng & Yang (2003) by examining the effect of extreme working capital from operations on the incremental information content of cash flow from operations and working capital from operations. There are two main reasons for examining the effect of extreme working capital from operations on the incremental information content of cash flow.

1. There is only weak and inconsistent evidence that current accruals component of earnings is valued differently from cash flow component by investors. To assess whether this result is altered and whether the market will give higher value for cash flow from operations over current accruals when working capital from operations is extreme, the effect of the extremity of working capital from operations on the incremental information content of cash flow is examined. This is to see whether separate disclosure of cash flow from operations and extreme current accruals would be preferred to investors when working capital from operations is extreme.
2. Cheng & Yang (2003) showed that cash flow from operations has higher valuations than extreme total accruals, to assess the generality of their finding and to see whether this finding is obtained regarding the relation between cash flow from operations and extreme current accruals, the

effect of the extremity of working capital from operations on the incremental information content of cash flow is examined.

As with prior work on the effect of extreme earnings on the incremental information content of cash flow, this study expects that extreme working capital from operations has less information content and when working capital from operations is extreme the market will look for another measure which has more information content and the good surrogate measure for working capital from operations is cash flow from operation.

Consistent with our investigation into the effect of extreme earnings on the incremental information content of cash flow and earnings, when we examine the effect of extremity of working capital from operations on the incremental information content of working capital from operations and cash flow from operations, this study controls for the extremity of cash flow from operations based upon the belief that moderate cash flow from operations has more information content than extreme cash flow (Ali, 1994). This is because this study expects that, when working capital from operations is extreme, the incremental information content of cash flow from operations will be conditional on its extremity. In other words, even if working capital from operations is extreme the incremental information content of cash flow from operations does not exist for the extreme cash flow from operations, but exists only for moderate cash flow from operations.

In the light of the above discussion, this study extends the findings of Cheng & Yang (2003) by presenting a testable hypothesis regarding the effect of the extremity of working capital from operations on the incremental information content of cash flow from operations and working capital from operations. This lead to the following hypothesis:

- **When working capital from operations is extreme the incremental information content of cash flow from operations exists only for moderate cash flow from operations and not for extreme cash flow from operations.**

The contextual models with a dummy variable approach for measuring the effect of the extremity (Model 3 & Model 4) are set up as follows²³⁷:

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \varepsilon_{it}$$

Where

- R_{it} is the annual market adjusted stock returns of firm i measured over the fifth month of year t to the fourth month of year $t+1$.
- A. In the case of testing the effect of earnings extremity on the incremental information content of cash flow from operations and earnings (in the first stage):
 - ΔE_{it} (E_{it}) is the change (level) in earnings and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm i in year t . Change and level of earnings and cash flow are deflated by the market value of equity at the beginning of year t .
 - Sum of $(\alpha_1 + \alpha_3)$ is the sum of the estimated coefficients of the change and level of earnings when earnings are moderate.
 - Sum of $(\alpha_2 + \alpha_4)$ is the sum of the estimated coefficients of the change and level of (moderate cash flow from operation in model 3) (extreme cash flow from operation in model 4) when earnings are moderate²³⁸.
 - Sum of $(\alpha_5 + \alpha_7)$ is the sum of the estimated coefficients of the change and level of earnings in the existence of its extremity.
 - Sum of $(\alpha_6 + \alpha_8)$ is the sum of the estimated coefficients of the change and level of (moderate cash flow from operations in model 3) (extreme cash flow from operations in model 4) conditioned on the extremity of earnings.

²³⁷Following Cheng & Yang (2003) " these models do not include the dummy variable as a regressor because we do not have an apparent reason to believe that the earnings (or cash flow from operations) extremity will affect the intercept. Thus, we assume that the intercept is not conditioned on extremity and avoid adding intercept dummies to keep our model manageable" (P. 113).

²³⁸ The explanation of model 3 and model 4 is given next.

In respect to testing the effect of the earnings extremity on the incremental information content of cash flow from operations and earnings, this study measures the extremity of earnings and controls for the extremity of cash flow from operations by following the same methodology of Cheng & Yang (2003). Following Cheng & Yang (2003), earnings deflated by the market value of equity at the end of year t are used to measure the extremity of earnings and cash flow from operations deflated by the market value of equity at the end of year t is used to control for the extremity of cash flow from operations. The following procedures are performed to measure the extremity of earnings and to control for the extremity of cash flow from operations where the whole sample of the study in each year is divided into two sub-samples (moderate cash flow model 3 and extreme cash flow model 4) as follows.

- The first sub-sample represents moderate cash flow from operations (Model 3). The ratios of cash flow from operations to market value of equity at the end of year t are used to determine moderate cash flow from operations. Moderate cash flow from operations is defined by dividing the observations in each year into nine groups depending upon the magnitude of cash flow from operations ratios with an approximately equal number of firms per group where the tenth group is assigned to firms with negative cash flow ratios. The middle six groups are considered as moderate cash flow from operations. Moderate cash flow from operations observations, in this sub-sample, are classified into two groups: moderate earnings, and extreme earnings. The ratios of earnings to market value of equity at the end of year t are used to determine the two groups. All firms in each year are divided into nine groups depending upon the magnitude of earnings ratios with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative earnings ratios. The middle six groups are classified as moderate and the other four groups are classified as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms. The regression analysis is then conducted for Model 3.

In model 3, this study hypothesises a positive and significant value for the sum of $(\alpha_6 + \alpha_8)$ and a negative and significant value for the sum of $(\alpha_5 + \alpha_7)$.

$$H_0: (\alpha_6 + \alpha_8) = 0 \quad \& \quad (\alpha_5 + \alpha_7) = 0$$

$$H_a: (\alpha_6 + \alpha_8) > 0 \quad \& \quad (\alpha_5 + \alpha_7) < 0$$

A positive and significant value for the sum of $(\alpha_6 + \alpha_8)$ in model 3 implies that, when earnings are extreme the incremental information content exists for moderate cash flow from operations. A negative and significant value for the sum of $(\alpha_5 + \alpha_7)$ implies that the extremity of earnings lead to a negative effect on the incremental information content of earnings.

- The second sub-sample represents extreme cash flow from operations (Model 4). The ratios of cash flow from operations to market value of equity at the end of year t are used to determine extreme cash flow from operations. Extreme cash flow from operations is defined by dividing the observations in each year into nine groups depending upon the magnitude of cash flow from operations ratios with an approximately equal number of firms per group where the tenth group is assigned to firms with negative cash flow from operations ratios. The first, second, ninth and tenth groups are considered as extreme cash flow from operations. Extreme cash flow from operations observations, in this sub-sample, are classified into two groups: moderate earnings, and extreme earnings. The ratios of earnings to market value of equity at the end of year t are used to determine the two groups. All firms in each year are divided into nine groups depending upon the magnitude of earnings ratios with an approximately equal number of firms per group, whereas the tenth group is assigned to firms with negative earnings ratios. The middle six groups are classified as moderate and the other four groups are classified as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms. The regression analysis is then conducted for Model 4.

In model 4, this study hypothesises a negative and significant (or positive but not significant) value for the sum of $(\alpha_6+\alpha_8)$ and a negative and significant value for the sum of $(\alpha_5+\alpha_7)$.

$$H_0: (\alpha_6+\alpha_8) = 0 \quad \& \quad (\alpha_5+\alpha_7) = 0$$

$$H_a: (\alpha_6+\alpha_8) < 0 \quad \& \quad (\alpha_5+\alpha_7) < 0$$

A negative and significant (or positive but not significant) value for the sum of $(\alpha_6+\alpha_8)$ in model 4 implies that, even when earnings are extreme, the incremental information content does not exist for extreme cash flow from operations. A negative and significant value for the sum of $(\alpha_5+\alpha_7)$ implies that the extremity of earnings lead to a negative effect on the incremental information content of earnings.

B. In the case of testing the effect of working capital from operations extremity on the incremental information content of cash flow and working capital from operations (in the second stage):

- ΔE_{it} (E_{it}) is the change (level) in working capital from operations and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm i in year t . Change and level of working capital from operations and cash flow are deflated by the market value of equity at the beginning of year t .
- Sum of $(\alpha_1+\alpha_3)$ is the sum of the estimated coefficients of the change and level of working capital from operations when working capital from operations is moderate.
- Sum of $(\alpha_2+\alpha_4)$ is the sum of the estimated coefficients of the change and level of (moderate cash flow from operation in model 3) (extreme cash flow from operation in model 4) when working capital from operations is moderate²³⁹.
- Sum of $(\alpha_5+\alpha_7)$ is the sum of the estimated coefficients of the change and level of working capital from operations in the existence of its extremity.
- Sum of $(\alpha_6+\alpha_8)$ is the sum of the estimated coefficients of the change and level of (moderate cash flow from operations in model 3) (extreme cash

²³⁹ The explanation of model 3 and model 4 is given next.

flow from operations in model 4) conditioned on the extremity of working capital from operations.

In respect to testing the effect of the extremity of working capital from operations on the incremental information content of cash flow from operations and working capital from operations, this study measures the extremity of working capital from operations and controls for the extremity of cash flow from operations. Following a similar methodology used in measuring the extremity of earnings and cash flow from operations, working capital from operations deflated by the market value of equity at the end of year t is used to measure the extremity of working capital from operations and cash flow from operations deflated by the market value of equity at the end of year t is used to control for the extremity of cash flow from operations. The following procedures are performed to measure the extremity of working capital from operations and to control for the extremity of cash flow from operations where the whole sample of the study in each year is divided into two sub-samples (moderate cash flow model 3 and extreme cash flow model 4) as follows.

- The first sub-sample represents moderate cash flow from operations (Model 3). The ratios of cash flow from operations to market value of equity at the end of year t are used to determine moderate cash flow from operations. Moderate cash flow from operations is defined by dividing the observations in each year into nine groups depending upon the magnitude of cash flow from operations ratios with an approximately equal number of firms per group where the tenth group is assigned to firms with negative cash flow ratios. The middle six groups are considered as moderate cash flow from operations. Moderate cash flow from operations observations, in this sub-sample, are classified into two groups: moderate working capital from operations, and extreme working capital from operations. The ratios of working capital from operations to market value of equity at the end of year t are used to determine the two groups. All firms in each year are divided into nine groups depending upon the magnitude of working capital from operations ratios with an approximately equal number of firms per group, where the tenth group is

assigned to firms with negative working capital from operations ratios. The middle six groups are classified as moderate and the other four groups are classified as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms. The regression analysis is then conducted for Model 3.

In model 3, this study hypothesises a positive and significant value for the sum of $(\alpha_6 + \alpha_8)$ and a negative and significant value for the sum of $(\alpha_5 + \alpha_7)$.

$$H_0: (\alpha_6 + \alpha_8) = 0 \quad \& \quad (\alpha_5 + \alpha_7) = 0$$

$$H_a: (\alpha_6 + \alpha_8) > 0 \quad \& \quad (\alpha_5 + \alpha_7) < 0$$

A positive and significant value for the sum of $(\alpha_6 + \alpha_8)$ in model 3 implies that, when working capital from operations is extreme, the incremental information content exists for moderate cash flow from operations. A negative and significant value for the sum of $(\alpha_5 + \alpha_7)$ implies that the extremity of working capital from operations leads to a negative effect on the incremental information content of working capital from operations.

- The second sub-sample represents extreme cash flow from operations (Model 4). The ratios of cash flow from operations to market value of equity at the end of year t are used to determine extreme cash flow from operations. Extreme cash flow from operations is defined by dividing the observations in each year into nine groups depending upon the magnitude of cash flow from operations ratios with an approximately equal number of firms per group where the tenth group is assigned to firms with negative cash flow from operations ratios. The first, second, ninth and tenth groups are considered as extreme cash flow from operations. Extreme cash flow from operations observations, in this sub-sample, are classified into two groups: moderate working capital from operations, and extreme working capital from operations. The ratios of working capital from operations to market value of equity at the end of year t are used to determine the two groups. All firms in each year are divided into nine groups depending upon the magnitude of working

capital from operations ratios with an approximately equal number of firms per group, whereas the tenth group is assigned to firms with negative working capital from operations. The middle six groups are classified as moderate and the other four groups are classified as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms. The regression analysis is then conducted for Model 4.

In model 4, this study hypothesises a negative and significant (or positive but not significant) value for the sum of $(\alpha_6 + \alpha_8)$ and a negative and significant value for the sum of $(\alpha_5 + \alpha_7)$.

$$H_0: (\alpha_6 + \alpha_8) = 0 \quad \& \quad (\alpha_5 + \alpha_7) = 0$$

$$H_a: (\alpha_6 + \alpha_8) < 0 \quad \& \quad (\alpha_5 + \alpha_7) < 0$$

A negative and significant (or positive but not significant) value for the sum of $(\alpha_6 + \alpha_8)$ in model 4 implies that, even if when working capital from operations is extreme, the incremental information content does not exist for extreme cash flow from operations. A negative and significant value for the sum of $(\alpha_5 + \alpha_7)$ implies that the extremity of working capital from operations leads to a negative effect on the incremental information content of working capital from operations.

5.4.4 Estimation methods of the empirical models

Typical prior studies have employed OLS regression on cross-sectional data and pooled data, cross-sectional and time-series data, (Green, 1999). For estimating the empirical models, this study follows the same methodology of prior studies. Change model (Model 1), level and change combined model (Model 2) and the two contextual models with a dummy variable approach for measuring the effect of the extremity (Model 3 & Model 4) can be estimated in two ways: cross-sectionally by year, and pooling the data cross-sectionally by year and intertemporally.

5.4.4.1 Cross-sectionally by year

The first estimation method, cross-sectionally by year, is performed by estimating all previous four models separately for each of the seven sample years, 1996–2002. There is potential for cross-sectional correlation problems in

the residuals²⁴⁰ leading to similar consequences to those deriving from heteroscedasticity²⁴¹, (that is, understating the standard errors and hence overstate *t*-statistics), (Green, 1999). Consequently, this study employs the mean test (cross-temporal *t*-statistics) as suggested by Bernard (1987). In the mean test, the *t*-statistics is computed by dividing the mean of the yearly coefficients by its standard error. Thus, the inferences are based on the time series of the annual parameter estimates of the annual cross-sectional regression²⁴². Almost all prior work on incremental information content of cash flow and accruals employed cross-temporal *t*-statistics for making the inference regarding the incremental information content of cash flows and accruals²⁴³.

5.4.4.2 Pooling the data cross-sectionally by year and intertemporally

The second estimation method, pooling the data cross-sectionally by year and intertemporally, is performed by estimating all previous four models by pooling the data for all seven sample years (1996 – 2002). To control for the potential effects of heteroskedasticity and autocorrelation in the residuals, the pooled regression is estimated under the white cross-section method which is derived by treating the pool regression as a multivariate regression, with an equation for each cross-section, and calculating white-type robust standard errors for the system of equations²⁴⁴ (EViews 5 user's Guide, PP 855: 856).

²⁴⁰For more details about the potential problems of cross-sectional correlation in the residuals see Bernard (1987).

²⁴¹ See for example: Maddala (2001, P207) and Greene (2000 , Chapter 11) for the potential problem deriving from heteroscedasticity

²⁴² This procedure is known as Fama-MacBeth (1973) regression analysis. See also Bernard's paper (1987) on cross-sectional dependency.

²⁴³ See prior studies on incremental information content of cash flow and earnings in chapter 4.

²⁴⁴ For more details of white cross-sectional method, see:

(1) Wooldridge, Jeffery, M., (2002) Econometric Analysis of Cross Section and Panel Data. Cambridge, the MIT Press, PP. 148-153.

(2) Arellano, Manuel, (2003) Panel Data Econometrics: Advanced Test in Econometrics, Oxford, University Press, Chapter 2: Unobserved Heterogeneity.

5.4.5 Robustness checks

The robustness of the results is examined under two extensions as follows.

5.4.5.1 Using raw return as a dependent variable

The above models are estimated depending upon using the annual market adjusted stock returns measured over the fifth month of year t to the fourth month of year $t+1$. As a first extension to the empirical work, this study uses the annual raw returns computed over May in year t to April in year $t+1$ (four months lag period) as a dependent variable instead of the annual market adjusted return²⁴⁵.

Several studies checked the results by using the raw returns as a dependent variable (e.g., Ali, 1994; Ali & Pope, 1994, 1995; Cheng & Yang, 2003)

5.4.5.2 An alternative method for measuring the extremity

As a second extension to the empirical work, this study uses an alternative method²⁴⁶ to measure the extremity of earnings (working capital from operations) and its effects on incremental information content of cash flow from operations with controlling for to the extremity of cash flow from operations itself. The two contextual models with a dummy variable approach (Model 3 and model 4) are re-estimated by using an alternative method for measuring the extremity (the absolute value of changes in the respective measure scaled by beginning price) to test the following.

- The effect of the extremity of earnings on the incremental information content of cash flow from operations and earnings.
- The effect of the extremity of working capital from operations on the incremental information content of cash flow from operations and working capital from operations.

²⁴⁵ See Appendix B for the results reported based on using the annual raw returns as a dependent variable.

²⁴⁶ See Appendix C for more details of the results reported based on using the other method for measuring the extremity of earnings (and working capital from operations) and its effects on the incremental information content of cash flow from operations with controlling for the extremity of cash flow from operations itself. This method is the absolute value of changes in earnings (working capital from operations) (cash flow) scaled by beginning price.

5.5 Summary

This study examines the incremental information content of earnings, working capital from operations, and cash flow from operations. The analysis is conducted in two separate stages. In the first stage, the study investigates the incremental information content of cash flow from operations and earnings and measures the effect of extreme earnings on the incremental information content of cash flow from operations and earnings. In the second stage, the study seeks to assess the findings of the first stage that examines the incremental information content of cash flow and earnings by developing testable hypotheses on the incremental information content of cash flow from operations and working capital from operations, followed by measuring the effect of extreme working capital from operations on the incremental information content of cash flow from operations and working capital from operations.

To achieve this objective, this chapter provided research design and the methodology for testing the incremental information content of earnings, working capital from operations, and cash flow from operations. Research design and methodology of the current study have been divided into three main points: variables definition, sample selection, and the empirical models of testing the incremental information content of earnings, working capital from operations, and cash flow from operations.

In the variables definition section, earnings before extraordinary items and cash flow from operations have been determined to test the incremental information content of cash flow and earnings and the effect of extreme earnings on the incremental information content of cash flow from operations. Working capital from operations and cash flow from operations has been determined to examine the incremental information content of cash flow from operations and working capital from operations and the effect of extreme working capital from operations on the incremental information content of cash flow from operations.

In the sample selection and data collection section, the sample size has been determined, in the light of certain criteria, separately for each stage from the two stages which are conducted in this study.

In the empirical models section, research hypotheses and four models have been developed based on recent work on the incremental information content of cash flow and earnings. Change model (Model 1) and change and level combined model (Model 2) have been employed to examine (i) the incremental information content of cash flow and earnings, and (ii) the incremental information content of cash flow from operations and working capital from operations. Contextual models with a dummy variables approach (Model 3 and model 4) have been developed to investigate (i) the impact of extreme earnings on the incremental information content of cash flow from operations with controlling for the extremity of cash flow from operations, and (ii) the impact of extreme working capital from operations on the incremental information content of cash flow from operations with controlling for the extremity of cash flow from operations.

Two separate empirical works will be conducted in this study. First, examining the incremental information content of cash flow from operations and earnings, and the effect of extreme earnings on the incremental information content of cash flow from operations. Second, examining the incremental information content of cash flow from operations and working capital from operations, and the effect of extreme working capital from operations on the incremental information content of cash flow from operations. The empirical results and the implications of the proposed hypotheses are empirically investigated and presented in the next chapter.

Chapter 6: Empirical results

6.1 Introduction

6.2 Descriptive statistics

6.2.1 Descriptive statistics on cash flow from operations and earnings

6.2.2 Descriptive statistics on cash flow from operations and working capital from operations

6.3 The incremental information content of cash flow from operations and earnings

6.3.1 Change model regression results (model 1)

6.3.2 Level and change combined model regression results (model 2)

6.3.3 The effect of the extremity of earnings on the incremental information content of cash flow from operations and earnings whilst controlling for the extremity of cash flow (models 3 and 4)

6.4 The incremental information content of cash flow from operations and working capital from operations

6.4.1 Change model regression results (model 1)

6.4.2 Level and change combined model regression results (model 2)

6.4.3 The effect of the extremity of working capital from operations on the incremental information content of cash flow from operations and working capital from operations whilst controlling for the extremity of cash flow (models 3 and 4)

6.5 Summary and discussion of the results

Chapter 6: Empirical results

6.1 Introduction

Depending upon the research hypotheses and the empirical models which have been presented in the previous chapter (chapter 5) the aim of the present chapter is to test the research hypotheses by presenting the results of the empirical models of testing the incremental information content of earnings, working capital from operations and cash flow from operations²⁴⁷. As stated before, the investigation of the incremental information content of earnings, working capital from operations, and cash flow from operations is conducted in two separate stages²⁴⁸. First, following recent U.S. and U.K. work (e.g., Cheng et al., 1996; Charitou et al., 2001; Cheng & Yang, 2003), the study investigates the incremental information content of cash flow from operations and earnings, and then examines the effect of earnings extremity on the incremental information content of cash flow from operations and earnings. Second, the study extends recent U.S. work via examining the incremental information content of cash flow from operations and working capital from operations in separate empirical models to identify whether cash flow from operations and current accruals are evaluated differentially. The work also examines the effect of working capital extremity on the incremental information content of cash flow from operations and working capital from operations. The results of the second stage are considered as an evaluation of the results of the first stage.

Descriptive statistics on cash flow from operations and earnings followed by descriptive statistics on cash flow from operations and working capital from operations are presented in section 2. The results of testing the incremental information content of cash flow from operations and earnings followed by the results of testing the incremental information content of cash flow from operations and working capital from operations are presented in sections 3 and 4

²⁴⁷ For further details of research hypotheses and empirical models of testing the incremental information content of cash flow from operations and earnings and testing the incremental information content of cash flow from operations and working capital from operations, see chapter 5, section 5.4.3.

²⁴⁸ For the rationale of conducting these two separate stages, see research problem and contribution of this study in chapter 1.

respectively. Section 5 presents the discussion and the analysis of the empirical results, and concludes this chapter.

6.2 Descriptive statistics

6.2.1 Descriptive statistics on cash flow from operations and earnings

Descriptive statistics of cash flow from operations and earnings for the pooled data are reported in table 6-1. Panel A and panel B show the descriptive statistics and correlation results respectively for all the variables, deflated by the market value of equity at the beginning of year t , of the regression models of the incremental information content of cash flow from operations and earnings.

Panel A, the descriptive statistics for the pooled data reveals that:

- The mean of earnings (change in earnings) and cash flow from operations (change in cash flow from operations), deflated by the market value of equity at the beginning of year t , is 0.017 (0.001) and 0.087 (0.012), respectively.

The above results indicate that the mean of earnings (change in earnings) are less than the mean of cash flow from operations (change in cash flow from operations). These results are expected because non-cash expenses such as depreciation, and amortization reduces earnings and these items are added back to cash flow from operations.

- The standard deviation of earnings (change in earnings) and cash flow from operations (change in cash flow from operations), deflated by the market value of equity at the beginning of year t , is 0.2 (0.184) and 0.157 (0.134), respectively.

The above results indicate that the standard deviation of earnings (change in earnings) is higher than the standard deviation of cash flow from operations (change in cash flow from operations). These results are not expected because earnings have the flexibility inherent in generally accepted accounting principles which provides managers with the opportunity to use accruals to smooth out the variations in cash flow across years. However, the above values are fairly close.

Panel B, the correlation matrix between the variables for the Pooled data reveals that:

- The coefficient of Pearson correlation between market adjusted returns and earnings (change in earnings) is **0.284 (0.185)**. These values are positive and significantly greater than zero.
- The coefficient of Pearson correlation between market adjusted return and cash flow from operations (change in cash flow from operations) is **0.254 (0.095)**. These values are positive and significantly greater than zero.
- The coefficient of Pearson correlation between earnings (change in earnings) and cash flow from operations (change in cash flow from operations) is **0.458 (0.209)**. These values are positive and significantly greater than zero.

The above results indicate that market adjusted return is more highly correlated with earnings than with cash flow from operations. In addition, market adjusted return is more highly correlated with the changes in earnings than with changes in cash flow from operations. These results reveal that earnings (changes in earnings) have more information content than cash flow from operations (changes in cash flow from operations). The number of the correlations coefficients between the independent variables suggests that multicollinearity is not likely to be a problem when examining the incremental information content of cash flow and earnings in the first stage of this study.

Table 6-1 Descriptive statistics on cash flow from operations and earnings

Panel A: Descriptive statistics of the variables

	R_{it}	ΔE_{it}	ΔCF_{it}	E_{it}	CF_{it}
Mean	-0.137	0.001	0.012	0.017	0.087
Standard deviation	0.513	0.184	0.134	0.2	0.157
Median	-0.089	0.006	0.005	0.06	0.086
Minimum	-2.89	-1.147	-0.732	-2.94	-1.375
Maximum	1.744	2.358	0.992	1.153	1.246

Panel B: Correlation Matrix among the variables

	R_{it}	ΔE_{it}	ΔCF_{it}	E_{it}	CF_{it}
R_{it}	1.000	.185*	0.095*	0.284*	0.254*
ΔE_{it}		1.000	0.209*	0.424*	0.087*
ΔCF_{it}			1.000	0.052*	0.465*
E_{it}				1.000	0.458*
CF_{it}					1.000

Notes:

- The number of observations = 6851 firm year observations.
- R_{it} is the annual market adjusted stock return of firm i measured over the fifth month of year t to the fourth month of year $t+1$.
- ΔE_{it} (E_{it}) is the change (level) in earnings and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm i in year t . All the explanatory variables are deflated by the market value of equity at the beginning of year t .
- Pearson correlation coefficients are in the cells above the diagonal.
- * Denotes statistical significance at the 0.01 level.

6.2.2 Descriptive statistics on cash flow from operations and working capital from operations

Descriptive statistics of cash flow from operations and working capital from operations for the pooled data are reported in table 6-2. Panel A and panel B show the descriptive statistics and correlation results respectively for all the variables, deflated by the market value of equity at the beginning of year t , of the regression models of the incremental information content of cash flow from operations and working capital from operations.

Panel A, the descriptive statistics for the pooled data reveals that:

- The mean of working capital from operations (change in working capital from operations) and cash flow from operations (change in cash flow from operations) is 0.095 (0.009) and 0.087 (0.012), respectively.

The results above indicate that the mean of working capital from operations is higher than the mean of cash flow from operations. This result reveals that current accruals component of earnings (change in working capital except change in cash and its equivalents and except change in short term borrowings) has a positive value.

- The standard deviation of working capital from operations (change in working capital from operations) and cash flow from operations (change in cash flow from operations) is 0.147 (0.103) and 0.155 (0.134), respectively.

The results above indicate that the standard deviation of working capital from operations (change in working capital from operations) is lower than the standard deviation of cash flow from operations (change in cash flow from operations). These results are expected because managers can use current accruals to smooth the fluctuations in cash flow across years.

Panel B, the correlation matrix between the variables for the pooled data shows that:

- The coefficient of Pearson correlation between market adjusted return and working capital from operations (changes in working capital from

operations) is **0.322 (0.203)**. These values are positive and significantly greater than zero.

- The coefficient of Pearson correlation between market adjusted return and cash flow from operations (change in cash flow from operations) is **0.259 (0.090)**. These values are positive and significantly greater than zero.
- The coefficient of Pearson correlation between working capital from operations (changes in working capital from operations) and cash flow from operations (change in cash flow from operations) is **0.769 (0.460)**. These values are positive and significantly greater than zero.

The results above indicate that market adjusted return is more highly correlated with working capital from operations than cash flow from operations. Market adjusted return is also more highly correlated with the change in working capital from operations than change in cash flow from operations. These results reveal that working capital from operations (changes in working capital from operations) has more information content than cash flow from operations (changes cash flow from operations). The relatively high number of the correlation coefficient between the working capital from operations and cash flow from operations suggests that multicollinearity is likely to be a problem when examining the incremental information content of cash flow and working capital from operations in the second stage of this study.

Table 6-2 Descriptive statistics on cash flow from operations and working capital from operations
Panel A: Descriptive statistics of the variables

	R_{it}	ΔE_{it}	ΔCF_{it}	E_{it}	CF_{it}
Mean	-0.137	0.009	0.012	0.095	0.087
Standard deviation	0.515	0.103	0.134	0.147	0.155
Median	-0.09	0.008	0.005	0.101	0.086
Minimum	-2.889	-0.768	-0.732	-1.393	-1.375
Maximum	1.744	0.92	0.979	1.431	1.246

Panel B: Correlation Matrix among the variables

	R_{it}	ΔE_{it}	ΔCF_{it}	E_{it}	CF_{it}
R_{it}	1.000	0.203*	0.090*	0.322*	0.259*
ΔE_{it}		1.000	0.460*	0.367*	0.231*
ΔCF_{it}			1.000	0.162*	0.466*
E_{it}				1.000	0.769*
CF_{it}					1.000

Notes:

- The number of observations = 6869 firm year observations.
- R_{it} is the annual market adjusted stock return of firm i measured over the fifth month of year t to the fourth month of year $t+1$.
- ΔE_{it} (E_{it}) is the change (level) in working capital from operations and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm i in year t . All the explanatory variables are deflated by the market value of equity at the beginning of year t .
- Pearson correlation coefficients are in the cells above the diagonal.
- * Denotes statistical significance at the 0.01 level.

6.3 The incremental information content of cash flow from operations and earnings²⁴⁹

Following recent U.S. and U.K work (e.g., Cheng et al., 1996; Charitou et al., 2001; Cheng & Yang, 2003), in this section the first stage of the study is conducted. The first stage investigates the incremental information content of cash flow from operations and earnings. This is followed by an examination of the effect of earnings extremity on the incremental information content of cash flow from operations and earnings.

Both the change model (random walk model) (model 1) and the level and change combined model (model 2) (the sum of the coefficients for the level and change in earnings and cash flow from operations is used for testing the incremental information content) have been used to test the incremental information content of cash flow from operations and earnings. Further analysis has focused on the level and change combined model where the two contextual models with a dummy variable approach (models 3 and 4) have been employed to examine the effect of extreme earnings on the incremental information content of cash flow from operations and earnings²⁵⁰. As indicated before (chapter 5, section 5.4.4.1), this study employs the mean test (cross-temporal *t*-statistics) in the case of the annual regressions.

6.3.1 Change model regression results (model 1)

The results of the change model (model 1) used for testing the incremental information content of cash flow and earnings are reported in table 6-3. Coefficients and statistics for (1) year-by-year, mean, and (2) pooled cross-sectional time-series regression results on the association of change in earnings, change in cash flow from operations, and market adjusted return, for the period 1996-2002, are presented in Panels A, and B respectively.

In panel A, the mean of the yearly coefficients of changes in earnings is 0.58 (*t* statistics = 7.98). The value of 0.58 is significantly positive at the 1% level. The

²⁴⁹ For robustness check see the empirical results reported based on using the annual raw returns as a dependent variable in Appendix B. The results were identical to those derived from using market adjusted return as a dependent variable.

²⁵⁰ See chapter 5, section 5.4.3 for a full discussion of these four models.

mean of the yearly coefficients of changes in cash flow from operations is **0.25** ($t = 7.01$). The value of **0.25** is significantly positive at the 1% level. These results indicate incremental information content for earnings beyond cash flow from operations and for cash flow from operations beyond earnings.

In panel B, the pooled analysis generates similar results. The coefficient of changes in earnings is **0.48** ($t = 5.93$). The value of **0.48** is significantly positive at the 1% level. The coefficient of changes in cash flow is **0.23** ($t = 5.07$). The value of **0.23** is significantly positive at the 1% level. Again, these results indicate incremental information content for both earnings and cash flow from operations.

6.3.2 Level and change combined model regression results (model 2)

The results of the level and change combined model (model 2) used for testing the incremental information content of cash flow and earnings are reported in table 6-4. Coefficients and statistics for (1) year-by-year, mean, and (2) pooled cross-sectional time-series regression results on the association of the level and change in earnings, the level and change in cash flow from operations, and market adjusted return, for the period 1996-2002, are presented in panels A, and B respectively.

In panel A, the mean of the summed yearly coefficients of the level and change in earnings is **0.85** ($t = 9.31$). The value of **0.85** is significantly positive at the 1% level. The mean of the summed yearly coefficients of the level and change in cash flow is **0.46** ($t = 3.79$). The value of **0.46** is significantly positive at the 1% level. These results suggest that both earnings and cash flow from operations have incremental information content beyond each other.

In panel B, similar results are presented for the pooled regression. The summed coefficients of the level and change in earnings is **0.7** ($t = 11.31$). The value of **0.7** is significantly positive at the 1% level. The summed coefficients of the level and change in cash flow is **0.52** ($t = 3.6$). The value of **0.52** is significantly positive at the 1% level. Again, these results suggest that both earnings and cash flow from operations possess incremental information content beyond each other.

Moreover, in the cross-sectional regression, the mean adjusted R^2 increases to 0.13 in the level and change combined model (model 2) compared to 0.05 in the change model (model 1); and in the pooled regression increases to 0.11 in the level and change combined model (model 2) compared to 0.04 in the change model (model 1). These results suggest that including both the change and the level of cash flow and earnings in the regression model is a better specification than the random walk model. This is because the level and change specification reduces the measurement error when cash flow and earnings contain extreme components²⁵¹.

The results of the change model (model 1) and the level and change combined model (model 2) are consistent and reveal that both cash flow from operations and earnings have incremental information content beyond each other. These findings are consistent with recent U.S. studies that examined the incremental information content of cash flow from operations and earnings (e.g., Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang, 2003; among other). However, these results are not consistent with the results of Charitou et al., (2001) in the U.K. which showed that earnings have incremental information content beyond cash flow from operations whereas cash flow did not. This contradiction between the results of this study and Charitou et al. (2001) may be due to their definition of the earnings variable. They defined earnings as operating earnings which equals net income before extraordinary items, discontinued operations, special and non-operating items. The earnings variable in this study is defined in the same way as Cheng et al. (1996), Cheng et al. (1997), and Cheng & Yang (2003) which equals net income before extraordinary items and dividends.

Therefore, from the above results of models 1 and 2 which have been employed to examine the incremental information content of cash flow from operations and earnings, it can be stated that the following two hypotheses are accepted.

- **Earnings have incremental information content beyond that contained in cash flow from operations.**

²⁵¹ For the reasons for using the change and the level of earnings in earnings return relation, see chapter 3, section 3.4.2.

- **Cash flow from operations has incremental information content beyond that contained in earnings.**

The accounting interpretation of these results, in terms of disclosure of earnings components, reveal that cash flow from operations and total accruals are valued (associated with returns) differently from each other. In other words, these results indicate that cash flow from operations has higher valuation than total accruals. Hence, for a given amount of earnings, the stock market responds more favorably to cash flow from operations than total accruals, thus, investors prefer to observe both cash flow from operations and total accruals separately.

Table 6-3 The incremental information content of cash flow from operations and earnings:
model 1(change model): change in cash flow from operations and earnings

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \varepsilon_{it}$$

Year	<i>N</i>	Coefficients (<i>t</i> -statistics)			<i>Adj.R</i> ²
		<i>α</i> 0	<i>α</i> 1	<i>α</i> 2	
Panel A: cross-sectional regressions					
1996	917	-0.09	0.62	0.2	0.05
1997	1014	-0.26	0.53	0.25	0.04
1998	1050	-0.23	0.93	0.33	0.07
1999	983	0.02	0.53	0.16	0.04
2000	897	-0.07	0.47	0.24	0.04
2001	990	-0.17	0.67	0.4	0.05
2002	1000	-0.16	0.31	0.14	0.03
Mean		-0.14	0.58	0.25	0.05
<i>t</i> value		(-3.73)***	(7.98)***	(7.01)***	
Panel B: pooled cross-sectional time-series regression					
pooled	6851	-0.14	0.48	0.23	0.04
<i>t</i> value		(-4.08)***	(5.93)***	(5.07)***	

- Notes:
- N represents the number of firm-year observations for each year, and for the total number of observation respectively.
 - *R_{it}* is the annual market adjusted stock return of firm *i* measured over the fifth month of year *t* to the fourth month of year *t*+1.
 - ΔE_{it} is the change in earnings and ΔCF_{it} is the change in cash flow from operations for firm *i* in year *t*. These variables are deflated by the market value of equity at the beginning of year *t*
 - Mean represents the mean of the 7 yearly coefficients, and the *t*-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
 - In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
 - ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 6-4 The incremental information content of cash flow from operations and earnings: model 2 (level and change combined model): level and change of cash flow from operations and earnings

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \varepsilon_{it}$$

Year	N	Coefficients (<i>t</i> -statistics)					Sum of ($\alpha 1 + \alpha 3$)	Sum of ($\alpha 2 + \alpha 4$)	Adj. <i>R</i> ²
		$\alpha 0$	$\alpha 1$	$\alpha 2$	$\alpha 3$	$\alpha 4$			
Panel A: cross-sectional regressions									
1996	917	-0.14	0.29	0.18	0.56	0.13	0.85	0.31	0.08
1997	1014	-0.35	0.21	-0.04	0.95	0.38	1.16	0.34	0.14
1998	1050	-0.29	0.38	0.08	0.68	0.44	1.06	0.52	0.13
1999	983	0.03	0.57	0.23	-0.05	-0.14	0.52	0.09	0.04
2000	897	-0.08	0.25	0.13	0.49	0.12	0.74	0.25	0.09
2001	990	-0.28	0.27	-0.57	0.74	1.63	1.01	1.06	0.27
2002	1000	-0.18	0.18	-0.05	0.42	0.7	0.6	0.65	0.15
Mean		-0.19	0.31	-0.01	0.54	0.47	0.85	0.46	0.13
<i>t</i> value		(-3.66)***	(6.15)***	(-0.06)	(4.57)***	(2.13)**	(9.31)***	(3.79)***	
Panel B: pooled cross-sectional time-series regression									
Pooled	6851	-0.2	0.3	-0.08	0.4	0.6	0.7	0.52	0.11
<i>t</i> value		(-4.19)***	(5.3)***	(-0.83)	(8.79)***	(2.56)**	(11.31)***	(3.6)***	

Notes:

- N represents the number of firm-year observations for each year and for the total number of observation respectively.
- R_{it} is the annual market adjusted stock return of firm *i* measured over the fifth month of year *t* to the fourth month of year *t*+1.
- ΔE_{it} (E_{it}) is the change (level) in earnings and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm *i* in year *t*. These variables are deflated by the market value of equity at the beginning of year *t*.
- Mean represents the mean of the 7 yearly coefficients, and the *t*-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
- Sum of ($\alpha_1 + \alpha_3$) is the sum of the estimated coefficients of the change and level of earnings.
- Sum of ($\alpha_2 + \alpha_4$) is the sum of the estimated coefficients of the change and level of the cash flow from operations.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

6.3.3 The effect of the extremity of earnings on the incremental information content of cash flow from operations and earnings whilst controlling for the extremity of cash flow (models 3 and 4)²⁵²

In this section, the study provides direct evidence on the effect of earnings extremity on the incremental information content of cash flow and earnings, based on a research methodology applied by Cheng & Yang (2003) to U.S. data. Cheng and Yang (2003) developed a methodology in which it is possible to isolate extreme cash flow from operations from moderate ones whilst examining the effect of extreme earnings on the incremental information content of cash flow and earnings²⁵³.

Model 3 has been used to examine the effect of extreme earnings on the incremental information content of cash flow from operations and earnings for a moderate cash flow sub-sample, whereas, model 4 has been used to examine the effect of extreme earnings on the incremental information content of cash flow from operations and earnings for an extreme cash flow sub-sample²⁵⁴.

6.3.3.1 Contextual model with a dummy variable approach regression results for the sub-sample of moderate cash flow (model 3)

The results of the contextual model with a dummy variable approach (model 3) employed for testing the effect of extreme earnings on the incremental information content of cash flow and earnings for a moderate cash flow sub-sample are reported in table 6-5. Coefficients and statistics for (1) year-by-year, mean, and (2) pooled cross-sectional time-series regression results on the association of the level and change in earnings (and the level and change in earnings interacted with earnings extremity), the level and change in cash flow

²⁵² For robustness check see the empirical results reported based on using the absolute value of changes in cash flow (earnings) scaled by beginning price for measuring the extremity of cash flow (earnings) in Appendix C. The results showed that measuring cash flow (earnings) extremity by cash flow (earnings) to price ratios is superior to measuring cash flow (earnings) extremity by the absolute value of changes in cash flow (earnings) scaled by beginning price for detecting incremental information content for moderate cash when earnings are extreme

²⁵³ This means that this study isolates extreme cash flow from operations apart from moderate ones when examine the effects of extreme earnings on the incremental information content of cash flow and earnings.

²⁵⁴ See chapter 5, section 5.4.3 for a full discussion of these two models and for measuring the extremity of earnings (cash flow from operations) by earnings (cash flow from operations) to price ratios.

from operations (and the level and change in cash flow from operations interacted with earnings extremity), and market adjusted return, for the period 1996-2002, are presented in panels A, and B respectively. Sum of (α_5 and α_7) is the sum of the estimated coefficients of the change and level of earnings in the presence of its extremity (affected by earnings extremity), whereas, sum of (α_6 and α_8) is the sum of the estimated coefficients of the change and level of **moderate** cash flow from operations conditioned on the extremity of earnings (affected by earnings extremity). The incremental information content of **moderate** cash flow from operations when earnings are extreme is observed if sum of (α_6 and α_8) is positive and significant.

In panel A, the mean of the summed yearly coefficients of the level and change in earnings in the existence of its extremity (interacted with earnings extremity) (sum of α_5 and α_7) is **-4.2** ($t = -12.05$). The value of **-4.2** is significantly negative at 1% level. This result suggests a smaller impact from extreme earnings on abnormal returns. The mean of the summed yearly coefficients of the level and change in **moderate** cash flow from operations conditioned on the extremity of earnings (interacted with earnings extremity) (sum of α_6 and α_8) is **1.89** ($t = 7.07$). The value of **1.89** is significantly positive at 1% level. This result suggests that **moderate** cash flow from operations has a greater impact on abnormal returns in the existence of extreme earnings.

In panel B, similar results are presented for the pooled regression. The summed coefficients of the level and change in earnings in the presence of its extremity (interacted with earnings extremity) (sum of α_5 and α_7) is **-3.58** ($t = -11.16$). The value of **-3.58** is significantly negative at the 1% level. The summed coefficients of the level and change of **moderate** cash flow from operations conditioned on the extremity of earnings (interacted with earnings extremity) (sum of α_6 and α_8) is **1.73** ($t = 8.74$). The value of **1.73** is significantly positive at the 1% level. Again, these results show a significantly negative impact of extreme earnings on abnormal returns and significantly positive impact of **moderate** cash flow when earnings are extreme.

6.3.3.2 Contextual model with a dummy variable approach regression results for the sub-sample of extreme cash flow (model 4)

The results for the contextual model with a dummy variable approach (model 4) employed for testing the effect of extreme earnings on the incremental information of cash flow and earnings for an **extreme** cash flow sub-sample are reported in table 6-6. Coefficients and statistics for (1) year-by-year, mean, and (2) pooled cross-sectional time-series regression results on the association of the level and change in earnings (and the level and change in earnings interacted with earnings extremity), the level and change in cash flow from operations (and the level and change in cash flow interacted with earnings extremity), and market adjusted return, for the period 1996-2002, are presented in Panels A, and B respectively. Sum of (α_5 and α_7) is the sum of the estimated coefficients of the change and level of earnings in the presence of its extremity (affected by earnings extremity), whereas, sum of (α_6 and α_8) is the sum of the estimated coefficients of the change and level of **extreme** cash flow from operations conditioned on the extremity of earnings (affected by earnings extremity). The incremental information content of **extreme** cash flow from operations when earnings are extreme is observed if sum of (α_6 and α_8) is positive and significant.

The summed coefficients of the level and change in earnings in the presence of its extremity (interacted with earnings extremity) (sum of α_5 and α_7) is significantly negative at 1% level (-2.51, $t = -4.28$, and -2.42, $t = -4.58$) for the annual regressions and pooled regression in panels A and B respectively. Similar to the results of model 3, these results show a significantly negative impact of extreme earnings on abnormal returns.

The summed coefficients of the level and change of **extreme** cash flow from operations conditioned on the extremity of earnings (interacted with earnings extremity) (sum of α_6 and α_8) is (0.27, $t = 1.64$, and 0.3, $t = 2.02$) for the annual regressions and pooled regression in panels A and B respectively. The value of 0.3 is significantly positive at the 5% level and the value of 0.27 is significantly positive at the 10%. These results indicate mixed and weak evidence of incremental information content for **extreme** cash flow from operations when earnings are extreme.

Together, the results of model 3 and model 4 reveal the following.

- Extreme earnings have negative and significant impact on abnormal returns regardless of whether cash flow is moderate or extreme (as shown above in the results of models 3 and 4 and as posited in the research hypotheses, see chapter 5, section 5.4.3.2).
- Extreme earnings lead to incremental information content for **moderate** cash flow from operations (as shown above in the results of model 3 and as posited in the research hypotheses, see chapter 5, section 5.4.3.2).
- Extreme earnings do not lead to incremental information content for **extreme** cash flow from operations (as shown above in the results of model 4 and as posited in the research hypotheses, see chapter 5, section 5.4.3.2).

The above findings are consistent with the study of Cheng & Yang (2003). Following Clubb (2003) for his discussion of the findings of Cheng & Yang (2003) study, additional analysis of the results of model 3 and model 4 from the perspective of the relative value relevance of cash flow component and total accruals component of earnings now is considered²⁵⁵. Defining earnings as the sum of a cash flow from operations and total accruals components.

- the implied summed coefficients of the level and change of cash flow can be calculated as the summed coefficients of the level and change of earnings plus summed coefficients of the level and change of cash flow, and
- the implied summed coefficients of the level and change of total accruals can be calculated as the summed coefficients of the level and change of earnings.

Using above relations, in model 3 (results reported in table 6-5) when earnings are moderate the implied summed coefficients of the level and change of cash flow is **5.31 (i.e. 4.81 + 0.5)** and the implied summed coefficients of the level

²⁵⁵ The above analysis is conducted for the mean of the summed yearly coefficients of the level and change in earnings (cash flow) derived from annual regression. These results lead to the same conclusion if the analysis is conducted for the summed coefficients of the level and change in earnings (cash flow) in the case of the pooled regression.

and change of total accruals is 4.81. When earnings are extreme the implied summed coefficients of cash flow is 3 (i.e. $4.81 + 0.5 - 4.2 + 1.89$) and the implied summed coefficients of total accruals is 0.61 (i.e. $4.81 - 4.2$). It can be noted that, when earnings are extreme there is a much sharper fall in the summed coefficient for extreme total accruals component (87%²⁵⁶) than for moderate cash flow component (44%²⁵⁷). These results mean that **moderate** cash flow becomes more important than extreme total accruals when earnings are extreme. This confirms the above results of model 3 regarding the existence of incremental information content of **moderate** cash flow when earnings are extreme.

In model 4 (results reported in table 6-6), when earnings are moderate, the implied summed coefficients of the level and change of cash flow is 3.17 (i.e. $3.08 + 0.09$) and the implied summed coefficients of the level and change of total accruals is 3.08. When earnings are extreme, the implied summed coefficients of the level and change of cash flow is 0.93 (i.e. $3.08 + 0.09 - 2.51 + 0.27$) and the implied summed coefficients of the level and change of total accruals is 0.57 (i.e. $3.08 - 2.51$). It can be noted that, there is not a large difference in the fall of the summed coefficient of extreme total accruals component (82%²⁵⁸) and extreme cash flow component (71%²⁵⁹) when earnings are extreme. This means that **extreme** cash flow and extreme total accrual is almost equivalently informative. This confirms the above results of model 4 regarding the lack of evidence of incremental information content of **extreme** cash flow when earnings are extreme.

Therefore, from the above analysis and the results of models 3 and 4 which have been employed to examine the effect of extreme earnings on incremental information content of cash flow from operations and earnings for a moderate cash flow sub-sample (model 3) and an extreme cash flow sub-sample (model 4), it can be stated that the following hypothesis is accepted:

²⁵⁶ $87\% = (4.81 - 0.61) / 4.81$.

²⁵⁷ $44\% = (5.31 - 3) / 5.31$.

²⁵⁸ $82\% = (3.08 - 0.57) / 3.08$.

²⁵⁹ $71\% = (3.17 - 0.93) / 3.17$.

- When earnings are extreme the incremental information content of cash flow from operation exists only for moderate cash flow and not for extreme cash flow.

The accounting interpretation of these results, in terms of disclosure of earnings components, reveal that moderate cash flow from operations and extreme total accruals are valued (associated with returns) differently from each other. In other words, these results indicate that moderate cash flow has higher valuation than extreme total accruals. Hence, for a given amount of extreme earnings, the stock market responds more favorably and much more sharply to moderate cash flow from operations than extreme total accruals. Thus, investors prefer to observe both moderate cash flow from operations and extreme total accruals separately when earnings are extreme. On the other hand, extreme cash flow from operations and extreme total accruals are valued (associated with returns) equivalently. Hence, for a given amount of extreme earnings, the stock market responds equivalently to extreme cash flow from operations and extreme total accruals. Thus, investors do not prefer to observe extreme cash flow from operations and extreme total accruals separately when earnings are extreme. This is because the two components are being valued equivalently and do not represent independent signals for the investor.

Table 6-5 The effect of the extremity of earnings on the incremental information content of cash flow from operations and earnings whilst controlling for the extremity of cash flow: contextual model with a dummy variable approach regression results for the sub-sample of moderate cash flow (model 3)

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \varepsilon_{it}$$

Coefficients (*t*-statistics)

Year	N	α_0	α_1	α_2	α_3	α_4	α_5	α_6	α_7	α_8	Sum of ($\alpha_1 + \alpha_3$)	Sum of ($\alpha_2 + \alpha_4$)	Sum of ($\alpha_5 + \alpha_7$)	Sum of ($\alpha_6 + \alpha_8$)	Adj. R^2
Panel A: cross-sectional regressions															
1996	559	-0.4	0.67	-0.28	4.75	-0.18	-0.74	0.36	-4.36	2.57	5.42	-0.46	-5.1	2.93	0.22
1997	587	-0.55	0.82	-0.07	2.9	1.36	-0.06	-0.15	-2.66	1.24	3.72	1.29	-2.72	1.09	0.24
1998	569	-0.49	0.61	-0.11	3.47	0.96	-0.36	0.4	-3.19	1.36	4.08	0.85	-3.55	1.76	0.23
1999	543	-0.22	0.72	0.26	3.62	-0.34	-0.27	-0.51	-3.64	2.38	4.34	-0.08	-3.91	1.87	0.18
2000	466	-0.28	0.75	0.11	4.53	-0.03	-0.35	-0.32	-4.18	1.6	5.28	0.08	-4.53	1.28	0.2
2001	469	-0.48	0.05	-0.56	5.9	1.7	0.11	0.25	-5.53	2.52	5.95	1.14	-5.42	2.77	0.38
2002	476	-0.31	-0.28	0.31	5.13	0.39	0.4	-0.51	-4.57	2.05	4.85	0.7	-4.17	1.54	0.33
Mean		-0.39	0.48	-0.05	4.33	0.55	-0.18	-0.07	-4.02	1.96	4.81	0.5	-4.2	1.89	0.26
<i>t</i> value		(-8.37)***	(3)**	(-0.42)	(10.91)***	(1.83)*	(-1.3)	(-0.45)	(-11.2)***	(9.27)***	(15.9)***	(2.01)**	(-12.05)***	(7.07)***	
Panel B: pooled cross-sectional time-series regression															
Pooled	3669	-0.39	0.36	-0.17	3.81	0.8	-0.15	0.02	-3.43	1.71	4.17	0.63	-3.58	1.73	0.22
<i>t</i> value		(-8.66)***	(2.31)**	(-1.1)	(13.69)***	(1.95)*	(-1.27)	(0.1)	(-12.25)***	(9.11)***	(13.03)***	(2.08)**	(-11.16)***	(8.74)***	

Notes

- N represents the number of firm-year observations for each year, and for the total number of observation respectively.
- R_{it} is the annual market adjusted stock return of firm *i* measured over the fifth month of year *t* to the fourth month of year *t* + 1.
- ΔE_{it} (E_{it}) is the change (level) in earnings and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm *i* in year *t*. These variables are deflated by the market value of equity at the beginning of year *t*.
- Mean represents the mean of the 7 yearly coefficients, and the *t*-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3 143 (0.01 level), 1 943 (0.05 level) and 1 440 (0.10 level).
- Sum of ($\alpha_5 + \alpha_7$) is the sum of the estimated coefficients of the change and level of earnings in the existence of its extremity.
- Sum of ($\alpha_6 + \alpha_8$) is the sum of the estimated coefficients of the change and level of moderate cash flow from operations conditioned on the extremity of earnings.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- The whole sample of each year has been divided into two sub-samples: a moderate cash flow sub-sample and an extreme cash flow sub-sample. The sample in model 3 is the sub-sample of moderate cash flow from operations observations. The ratio of cash flow from operations to market value of equity at the end of year *t* used to determine moderate cash flow from operations. Moderate cash flow from operations is defined by dividing all firms in each year into nine groups depending upon the magnitude of the ratio of cash flow from operations to market value of equity at the end of year *t* with an approximately equal number of firms per group where the tenth group is assigned to firms with negative ratio of cash flow from operations to market value of equity at the end of year *t*. The middle six groups are considered as moderate cash flow from operations. Moderate cash flow from operations observations, in this sub-sample, are classified into two groups: moderate earnings and extreme earnings. The ratio of earnings to market value of equity at the end of year *t* used to determine the two groups; all firms in each year are divided into nine groups depending upon the magnitude of the ratio of earnings to market value of equity at the end of year *t* with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratio of earnings to market value of equity at the end of year *t*. The middle six groups are classified as moderate and the other four groups are classified as extreme. D_{it} = 0 for moderate firms and D_{it} = 1 for extreme firms.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 6- 6 the effect of the extremity of earnings on the incremental information content of cash flow from operations and earnings whilst controlling for the extremity of cash flow: contextual model with a dummy variable approach regression results for the sub-sample of extreme cash flow (model 4)

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \varepsilon_{it}$$

Coefficients (*t*-statistics)

Year	N	α_0	α_1	α_2	α_3	α_4	α_5	α_6	α_7	α_8	Sum of ($\alpha_1 + \alpha_3$)	Sum of ($\alpha_2 + \alpha_4$)	Sum of ($\alpha_5 + \alpha_7$)	Sum of ($\alpha_6 + \alpha_8$)	Adj. R ²
Panel A: cross-sectional regressions															
1996	358	-0.21	0.24	0.29	2.64	-0.41	0.17	0.07	-2.45	0.43	2.88	-0.12	-2.28	0.5	0.12
1997	427	-0.43	0.47	0.37	2.16	0.11	-0.46	-0.57	-1.24	-0.07	2.63	0.48	-1.7	-0.64	0.2
1998	481	-0.38	0.76	0.09	2.04	-0.23	-0.41	-0.21	-1.67	0.77	2.8	-0.14	-2.08	0.56	0.13
1999	440	0.03	0.33	0.56	0.61	-0.71	0.09	-0.05	-0.66	0.35	0.94	-0.15	-0.57	0.3	0.04
2000	431	-0.18	0.3	-0.22	1.81	0.07	-0.3	0.7	-1.37	-0.28	2.11	-0.15	-1.67	0.42	0.09
2001	521	-0.47	0.38	-0.32	5.05	0.66	0.001	-0.28	-4.88	0.9	5.43	0.34	-4.88	0.62	0.28
2002	524	-0.39	-0.18	-0.01	4.91	0.37	0.37	0.16	-4.74	-0.04	4.73	0.36	-4.37	0.12	0.13
Mean		-0.29	0.33	0.11	2.75	-0.02	-0.08	-0.03	-2.43	0.3	3.08	0.09	-2.51	0.27	0.14
<i>t</i> value		(-4.97)***	(3.09)**	(0.9)	(4.41)***	(-0.11)	(-0.64)	(-0.17)	(-3.76)***	(1.75)*	(5.31)***	(0.81)	(-4.28)***	(1.64)*	
Panel B: pooled cross-sectional time-series regression															
Pooled	3182	-0.31	0.28	0.06	2.6	0.06	-0.01	-0.07	-2.41	0.37	2.88	0.12	-2.42	0.3	0.11
<i>t</i> value		(-4.85)***	(2.6)***	(0.52)	(4.63)***	(0.36)	(-0.14)	(-0.5)	(-4.12)***	(1.85)*	(5.35)***	(1.25)	(-4.58)***	(2.02)**	

Notes

- N represents the number of firm-year observations for each year, and for the total number of observation respectively.
- R_{it} is the annual market adjusted stock return of firm *i* measured over the fifth month of year *t* to the fourth month of year *t*+1.
- ΔE_{it} (E_{it}) is the change (level) in earnings and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm *i* in year *t*. These variables are deflated by the market value of equity at the beginning of year *t*.
- Mean represents the mean of the 7 yearly coefficients, and the *t*-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
- Sum of ($\alpha_5 + \alpha_7$) is the sum of the estimated coefficients of the change and level of earnings in the existence of its extremity.
- Sum of ($\alpha_6 + \alpha_8$) is the sum of the estimated coefficients of the change and level of earnings in the existence of its extremity.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- The whole sample of each year has been divided into two sub-samples: a moderate cash flow sub-sample and an extreme cash flow sub-sample. The sample in model 4 is the sub-sample of extreme cash flow from operations observations. The ratio of cash flow from operations to market value of equity at the end of year *t* used to determine extreme cash flow from operations. Extreme cash flow from operations is defined by dividing all firms in each year into nine groups depending upon the magnitude of the ratio of cash flow from operations to market value of equity at the end of year *t* with an approximately equal number of firms per group where the tenth group is assigned to firms with negative ratio of cash flow from operations to market value of equity at the end of year *t*. The first, second, ninth and tenth groups are considered as extreme cash flow from operations. Extreme cash flow from operations observations, in this sub-sample, are classified into two groups: moderate earnings and extreme earnings. The ratio of earnings to market value of equity at the end of year *t* used to determine the two groups; all firms in each year are divided into nine groups depending upon the magnitude of the ratio of earnings to market value of equity at the end of year *t* with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratio of earnings to market value of equity at the end of year *t*. The middle six groups are classified as moderate and the other four groups are classified as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

6.4 The incremental information content of cash flow from operations and working capital from operations²⁶⁰

In this section, the second stage of this study is conducted. Research on incremental information content of cash flow and earnings is primarily concerned with examining the securities market's differential pricing of earnings components: (i) non-current accruals, (ii) current accruals, and (iii) cash flow from operations. The first stage equivalent to recent U.S. and U.K. studies (e.g., Cheng et al., 1996; Charitou et al., 2001; Cheng & Yang, 2003) examined the incremental information content of cash flow from operations and earnings and provided evidence, similar to the results of those studies, of incremental information content of cash flow from operations beyond earnings. As indicated before, this means that cash flow from operations has higher market valuation than total accruals. With respect to the differential valuations of cash flow from operations and current accruals, it is not necessary that these results should hold where evidence of incremental information content of cash flow from operations beyond earnings which imply that cash flow from operations is more highly valued than total accruals does not necessarily imply that there is an incremental information content of cash flow from operations beyond working capital from operations which imply that cash flow from operations is more highly valued than current accruals²⁶¹. Given (i) the higher valuation of both current accruals and cash flow from operations than non-current accruals²⁶² (this issue has been widely documented see for example Rayburn, 1986; Wilson, 1986 & 1987; Pfeiffer et al., 1998; Pfeiffer & Elgers, 1999), and (ii) the weak evidence on the differential higher valuations of cash flow over current accruals (see for example, in the U.S., Rayburn, 1986; Bernard & Stober, 1989; Jennings,

²⁶⁰ For robustness check, see the empirical results reported based on using the annual raw returns as a dependent variable in Appendix B. The results were identical to those derived from using market adjusted return as a dependent variable.

²⁶¹ See chapter 1 for further details of the criticism of examining the incremental information content of cash flow from operations only beyond earnings and not beyond both earnings, and working capital from operations.

²⁶² Non-current accruals are less valued than both current accruals and cash flow from operations, however, non-current accruals are considered informative component of earnings. See, for example; Rayburn (1986), Bowen et al. (1987), Jennings (1990), Pfeiffer et al. (1998), and Pfeiffer & Elgers (1999).

1990; Ali, 1994; Pfeiffer et al., 1998²⁶³; and in the U.K., Board & Day, 1989; Board et al., 1989; Ali & Pope, 1994 & 1995; Green, 1999; Charitou et al., 2001), there are two possible interpretations of that evidence. One is that cash flow is more highly valued than current accruals. This interpretation supports the decomposition of earnings into its non-current accruals, current accruals and cash flow from operations components. An alternative interpretation is that cash flow from operations and current accruals are valued equivalently. This interpretation supports the decomposition of earnings into only its non-current accruals, and working capital from operations components. To distinguish between these two alternatives, and in order to assess the generality of recent U.S. findings that examined the incremental information content of cash flow from operations and earnings, as was conducted in the first stage, this section examines the incremental information content of cash flow from operations beyond working capital from operations to see whether cash flow from operations and current accruals are valued differentially by investors and hence the disaggregating of working capital components into current accruals and cash flow from operations are preferred to disclose separately.

In addition, in the first stage a replication of Cheng & Yang's (2003) U.S. study that examined the effect of extreme earnings on the incremental information content of cash flow was conducted. The results were consistent with Cheng & Yang (2003). These results showed that extreme earnings lead to incremental information content for moderate (not extreme) cash flow. As indicated before, this means that moderate (not extreme) cash flow from operations has higher market valuation than extreme total accruals. To assess the generality of these results regarding the relation between cash flow from operations and working capital from operations, this section also extends Cheng & Yang's (2003) U.S. study beyond the effect of extreme earnings on cash flow to search for the effect of extreme working capital from operations on the incremental information content of cash flow from operations. This is to assess whether cash flow from operations and extreme current accruals are valued differently, hence, to see

²⁶³ Pfeiffer et al., (1998) reported a statistically significant differential valuation of cash flow and current accruals when they employed a pooled cross-sectional and time series data for estimating surprises in earnings, working capital from operations, and cash flow from operations.

whether separate disclosure of cash flow from operations and extreme current accrual would be preferred by investors when working capital from operations is extreme.

Both the change model (random walk model) (model 1) and the level and change combined model (model 2) (the sum of the coefficients for the level and change in working capital from operations and cash flow from operations is used for testing the incremental information content) have been used to test the incremental information content of cash flow from operations and working capital from operations. Further analysis has focused on the level and change combined model where contextual models with a dummy variable approach (models 3 and model 4) have been employed to examine the effect of extreme working capital from operations on the incremental information content of cash flow from operations and working capital from operations²⁶⁴. As indicated previously (chapter 5, section 5.4.4.1), this study employs the mean test (cross-temporal *t*-statistics) in the case of the annual regressions.

6.4.1 Change model regression results (model 1)

The results of the change model (model 1) used for testing the incremental information content of cash flow from operations and working capital from operations are reported in table 6-7. Coefficients and statistics for (1) year-by-year, mean, and (2) pooled cross-sectional time-series regression results on the association of change in working capital from operations, change in cash flow from operations, and market adjusted return, for the period 1996-2002, are presented in panels A, and B respectively.

In panel A, the mean of the yearly coefficients of changes in working capital from operations is 1.2 (*t* statistics = 8.57). The value of 1.2 is significantly positive at the 1% level. The mean of the yearly coefficients of changes in cash flow from operations is -0.01 (*t* = -0.15). The value of -0.01 is negative and insignificant. These results indicate incremental information content for working capital from operations beyond cash flow from operations. However, they do not

²⁶⁴ See chapter 5, section 5.4.3 for a full discussion of these four models.

show incremental information content for cash flow from operation beyond working capital from operations.

In panel B, the pooled analysis generates similar results. The coefficient of changes in working capital from operations is **1.03** ($t = 8.57$). The value of **1.03** is significantly positive at the 1% level. The coefficient of changes in cash flow is **-0.02** ($t = -0.17$). The value of **-0.02** is negative and insignificant. Again, these results indicate incremental information content only for working capital from operations beyond cash flow from operations and not for cash flow from operations beyond working capital flow from operations.

6.4.2 Level and change combined model regression results (model 2)

The results of the level and change combined model (model 2) used for testing the incremental information content of cash flow and working capital from operations are reported in table 6-8. Coefficients and statistics for (1) year-by-year, mean, and (2) pooled cross-sectional time-series regression results on the association of the level and change in working capital from operations, the level and change in cash flow from operations and market adjusted return, for the period 1996-2002, are presented in panels A, and B respectively.

In panel A, the mean of the summed yearly coefficients of the level and change in working capital from operations is **1.56** ($t = 15.14$). The value of **1.56** is significantly positive at the 1% level. The mean of the summed yearly coefficients of the level and change in cash flow is **0.05** ($t = 0.56$). The value of **0.05** is positive but not significant at any conventional level. These results suggest that working capital from operations has incremental information content beyond cash flow from operations. However, these results fail to provide incremental information content for cash flow from operation beyond working capital from operations.

In panel B, similar results are present for the pooled regression. The summed coefficients of the level and change in working capital from operations is **1.4** ($t = 15.83$). The value of **1.4** is significantly positive at the 1% level. The summed coefficients of the level and change in working capital from operations is **0.11** (t

= 0.95). The value of 0.11 is positive but not significant at any conventional level. Again, these results document incremental information content for working capital from operations beyond cash flow from operations but not for the opposite case.

Moreover, in the cross-sectional regression, the mean adjusted R^2 rises to 0.14 in the level and change combined model (model 2) from 0.06 in the change model (model 1); and, in the pooled regression rises to 0.11 in the level and change combined model (model 2) from 0.04 in change model (model 1). These results suggest that including both the change and the level of cash flow and working capital from operations in the regression model is a better specification than that of the random walk model. This is because the level and change specification reduces the measurement error when cash flow and working capital from operations contain extreme components²⁶⁵.

The results of change model (model 1) and the level and change combined model (model 2) are consistent and reveal that working capital from operations have incremental information content beyond cash flow from operations, while cash flow from operations did not have incremental information content beyond working capital from operations. These findings are consistent with a large number of prior studies on evaluating the disclosures of earnings components (e.g. in the U.S. Schaefer & Kenneley, 1986; Bernard & Stober, 1989; Jennings, 1990; Ali 1994; Pfeiffer et al., 1998²⁶⁶; Pfeiffer & Elgers, 1999²⁶⁷; in the U.K., Board & Day, 1989; Board et al., 1989; Ali & Pope, 1995; Green, 1999).

However, these results show that the results of recent U.S. studies that examined the incremental information content of cash flow from operations only beyond earnings (e.g., Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang, 2003; among other) are not obtained when the incremental information content of cash flow is examined beyond working capital from operations. In other words, these

²⁶⁵ For the reasons for using the change and the level of earnings in earnings return relation, see chapter 3, section 3.4.2.

²⁶⁶ Pfeiffer et al., (1998) reported a statistically significant differential valuation of cash flow and current accruals when they employed a pooled cross-sectional and time series data for estimating surprises in earnings, working capital from operations, and cash flow from operations.

²⁶⁷ Pfeiffer & Elgers documented significant valuation differences for operating cash flow relative both current accruals and non-current accruals when they employed the levels and changes as proxy for surprises in earnings components.

results reveal that the results of recent U.S. studies that showed a higher market valuation for cash flow from operations over total accruals (e.g., Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang, 2003; among other) could not be supported and extended to the higher valuation of cash flow from operations over current accruals²⁶⁸.

Therefore, from the above results of models 1 and 2 which have been employed to examine the incremental information content of cash flow from operations and working capital from operations, it can be stated that the following hypothesis is accepted:

- Working capital from operations has incremental information content beyond that contained in cash flow from operations.

While, the following hypothesis is rejected:

- Cash flow from operations has incremental information content beyond that contained in working capital from operations.

The accounting interpretation of these results, in terms of disclosure of working capital from operations components, reveals that cash flow from operations and current accruals are valued (associated with returns) equivalently. Hence, for a given amount of working capital from operations, the stock market responds equivalently to cash flow from operations and current accruals, thus, disclosure of their sum which is working capital from operations is sufficient because investors are indifferent to which components contributed more or less to working capital from operations.

²⁶⁸ For and explanation of these results see section 6.5 later in this chapter.

Table 6-7 The incremental information content of cash flow from operations and working capital from operations: model 1(change model): change in cash flow from operations and working capital from operations

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \epsilon_{it}$$

Year	N	Coefficients (<i>t</i> -statistics)			Adj. <i>R</i> ²
		<i>α</i> 0	<i>α</i> 1	<i>α</i> 2	
Panel A: cross-sectional regressions					
1996	921	-0.09	1.33	0.06	0.09
1997	1015	-0.28	1.42	-0.06	0.09
1998	1053	-0.23	1.79	0.07	0.1
1999	984	0.01	1.24	-0.18	0.05
2000	900	-0.08	1.11	-0.12	0.04
2001	992	-0.18	0.71	0.33	0.03
2002	1004	-0.17	0.8	-0.17	0.02
Mean		-0.15	1.2	-0.01	0.06
<i>t</i> value		(-3.9)***	(8.57)***	(-0.15)	
Panel B: pooled cross-sectional time-series regression					
pooled	6869	-0.15	1.03	-0.02	0.04
<i>t</i> value		(-4.18)***	(8.57)***	(-0.17)	

- Notes:
- N represents the number of firm-year observations for each year, and for the total number of observation respectively.
 - R_{it} is the annual market adjusted stock return of firm i measured over the fifth month of year t to the fourth month of year $t+1$.
 - ΔE_{it} is the change in working capital from operations and ΔCF_{it} is the change in cash flow from operations for firm i in year t . These variables are deflated by the market value of equity at the beginning of year t
 - Mean represents the mean of the 7 yearly coefficients, and the t -statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
 - In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
 - ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 6-8 The incremental information content of cash flow from operations and working capital from operations: model 2 (level and change combined model): level and change of cash flow from operations and working capital from operations

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \varepsilon_{it}$$

Year	N	Coefficients (<i>t</i> -statistics)					Sum of (<i>a</i> 1+ <i>a</i> 3)	Sum of (<i>a</i> 2+ <i>a</i> 4)	Adj. R ²
		<i>a</i> 0	<i>a</i> 1	<i>a</i> 2	<i>a</i> 3	<i>a</i> 4			
Panel A: cross-sectional regressions									
1996	921	-0.15	0.92	0.14	0.66	-0.21	1.58	-0.07	0.1
1997	1015	-0.37	0.92	-0.1	0.78	0.13	1.7	0.03	0.15
1998	1053	-0.32	1.22	-0.05	0.72	0.16	1.94	0.11	0.14
1999	984	0.03	1.44	-0.27	-0.37	0.19	1.07	-0.08	0.06
2000	900	-0.13	0.63	-0.02	0.78	-0.21	1.41	-0.23	0.07
2001	992	-0.36	-0.13	-0.13	1.81	0.61	1.68	0.48	0.28
2002	1004	-0.25	0.44	-0.16	1.07	0.25	1.51	0.09	0.17
Mean		-0.22	0.78	-0.09	0.78	0.13	1.56	0.05	0.14
<i>t</i> value		(-4)***	(3.93)***	(-1.74)*	(3.2)***	(1.23)	(15.14)***	(0.56)	
Panel B: pooled cross-sectional time-series regression									
Pooled	6869	-0.24	0.6	-0.14	0.8	0.25	1.4	0.11	0.11
<i>t</i> value		(-4.56)***	(3.03)***	(-2.16)**	(3.13)***	(2.07)**	(15.83)***	(0.95)	

Notes:

- N represents the number of firm-year observations for each year and for the total number of observation respectively.
- R_{it} is the annual market adjusted stock return of firm i measured over the fifth month of year t to the fourth month of year t+1.
- ΔE_{it} (E_{it}) is the change (level) in working capital from operations and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm i in year t. These variables are deflated by the market value of equity at the beginning of year t.
- Mean represents the mean of the 7 yearly coefficients, and the t-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
- Sum of (α1+α3) is the sum of the estimated coefficients of the change and level of working capital from operations.
- Sum of (α2+α4) is the sum of the estimated coefficients of the change and level of the cash flow from operations.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

6.4.3 The effect of the extremity of working capital from operations on the incremental information content of cash flow from operations and working capital from operations whilst controlling for the extremity of cash flow from operations (models 3 and 4)²⁶⁹

The study extends Cheng & Yang's (2003) study in the U.S. which examined the effect of extreme earnings on the incremental information content of cash flow by examining the effect of extreme working capital from operations on the incremental information content of cash flow and working capital from operations based on a research methodology applied by Cheng & Yang (2003) to U.S. data.

Consistent with the investigation into the effect of extreme earnings on the incremental information content of cash flow as conducted in the first stage, when the effect of extremity of working capital from operations on the incremental information content of cash flow from operations is examined, the study controls for the extremity of cash flow from operations itself²⁷⁰.

Model 3 has been used to examine the effect of extreme working capital from operations on the incremental information content of cash flow from operations and working capital from operations for a moderate cash flow sub-sample, whereas, model 4 has been used to examine the effect of extreme working capital from operations on the incremental information content of cash flow from operations and working capital from operations for an extreme cash flow sub-sample²⁷¹.

²⁶⁹ For a robustness check, see the empirical results reported based on using the absolute value of changes in working capital from operations (cash flow from operations) scaled by the beginning price for measuring the extremity of working capital from operations (cash flow from operations) in Appendix C. The results were identical to those derived from using cash flow (working capital from operations) to price ratios for measuring the extremity of cash flow (working capital from operations).

²⁷⁰ This means that this study isolates extreme cash flow from operations from moderate ones when examining the effect of extreme working capital from operations on the incremental information content of cash flow from operations.

²⁷¹ See chapter 5, section 5.4.3 for a full discussion of these two models and for measuring the extremity of working capital from operations (cash flow from operations) by working capital from operations (cash flow from operations) to price ratios.

6.4.3.1 Contextual model with a dummy variable approach regression results for the sub-sample of moderate cash flow from operations (model 3)

The results of contextual model with a dummy variable approach (model 3) employed for testing the effect of extreme working capital from operations on the incremental information content of cash flow and working capital from operations for the **moderate** cash flow sub-sample are reported in table 6-9. Coefficients and statistics for (1) year-by-year, mean, and (2) pooled cross-sectional time-series regression results on the association of the level and change in working capital from operations (and the level and change in working capital from operations interacted with working capital from operations extremity), the level and change in cash flow from operations (and the level and change in cash flow from operations interacted with working capital from operations extremity), and market adjusted return, for the period 1996-2002, are presented in Panels A, and B respectively. Sum of (α_5 and α_7) is the sum of the estimated coefficients of the change and level of working capital from operations in the presence of its extremity (affected by working capital from operations extremity), whereas sum of (α_6 and α_8) is the sum of the estimated coefficients of the change and level of **moderate** cash flow from operations conditioned on the extremity of working capital from operations (affected by working capital from operations extremity). The incremental information content of **moderate** cash flow from operations when working capital from operations is extreme is observed if sum of (α_6 and α_8) is positive and significant.

In panel A, the mean of the summed yearly coefficients of the level and change in working capital from operations in the existence of its extremity (interacted with working capital from operations extremity) (sum of α_5 and α_7) is **-2.32** ($t = -6.86$). The value of **-2.32** is significantly negative at the 1% level. This result suggests a smaller impact from extreme working capital from operations on abnormal returns. The mean of the summed yearly coefficients of the level and change in **moderate** cash flow from operations conditioned by the extremity of working capital from operations (interacted with working capital from operations extremity) (sum of α_6 and α_8) is **1.73** ($t = 7.95$). The value of **1.73** is significantly positive at the 1% level. This result suggests that **moderate** cash

flow from operations having a greater impact on abnormal returns in the presence of extreme working capital from operations.

In panel B, similar results are presented for the pooled regression. The summed coefficients of the level and change in working capital from operations in the presence of its extremity (interacted with working capital from operations extremity) (sum of α_5 and α_7) is **-2.39** ($t = -10.84$). The value of **-2.39** is significantly negative at the 1% level. The summed coefficients of the level and change of **moderate** cash flow from operations conditioned on the extremity of working capital from operations (interacted with working capital from operations extremity) (sum of α_6 and α_8) is **1.58** ($t = 6.42$). The value of **1.58** is significantly positive at the 1% level. Again, these results show a significantly negative impact of extreme working capital from operations on abnormal returns and significantly positive impact of **moderate** cash flow when working capital from operations is extreme.

6.4.3.2 Contextual model with a dummy variable approach regression results for the sub-sample of extreme cash flow from operations (model 4)

The results of the contextual model with a dummy variable approach (model 4) employed for testing the effect of extreme working capital from operations on the incremental information content of cash flow and working capital from operations for an **extreme** cash flow sub-sample are reported in table 6-10. Coefficients and statistics for (1) year-by-year, mean, and (2) pooled cross-sectional time-series regression results on the association of the level and change in working capital from operations (and the level and change in working capital from operations interacted with working capital from operations extremity), the level and change in cash flow from operations (and the level and change in cash flow interacted with working capital from operations extremity), and market adjusted returns, for the period 1996-2002, are presented in panels A, and B respectively. Sum of (α_5 and α_7) is the sum of the estimated coefficients of the change and level of working capital from operations in the presence of its extremity (affected by working capital from operations extremity), whereas, sum of (α_6 and α_8) is the sum of the estimated coefficients of the change and level of **extreme** cash flow from operations conditioned by the extremity of working

capital from operations (affected by working capital from operations extremity). The incremental information content of **extreme** cash flow from operations when working capital from operations is extreme is observed if sum of (α_6 and α_8) is positive and significant.

In panel A, the mean of the summed yearly coefficients of the level and change in working capital from operations in the presence of its extremity (interacted with working capital from operations extremity) (sum of α_5 and α_7) is **-1.33** ($t = -4.1$). The value of **-1.33** is significantly negative at the 1% level. This result suggests a smaller impact from extreme working capital from operations on abnormal returns. The mean of the summed yearly coefficients of the level and change in **extreme** cash flow from operations conditioned by the extremity of working capital from operations (interacted with working capital from operations extremity) (sum of α_6 and α_8) is **0.15** ($t = 0.83$). The value of **0.15** is positive but not significant at any conventional level. This result suggests that extreme cash flow from operations has little impact on abnormal returns in the presence of extreme working capital from operations.

In panel B, similar results are presented for the pooled regression. The summed coefficients of the level and change in working capital from operations in the existence of its extremity (interacted with working capital from operations extremity) (sum of α_5 and α_7) is **-1.41** ($t = -5.69$). The value of **-1.41** is significantly negative at 1% level. The summed coefficients of the level and change of **extreme** cash flow from operations conditioned by the extremity of working capital from operations (interacted with working capital from operations extremity) (sum of α_6 and α_8) is **0.2** ($t = 1.24$). The value of **0.2** is positive but not significant at any conventional level. Again, these results show a significantly negative impact of extreme working capital from operations on abnormal returns and a lack of evidence of incremental information content for extreme cash flow when working capital from operations is extreme.

Together, the results of model (3) and model (4) reveal the following.

- Extreme working capital from operations has a negative and significant impact on abnormal returns regardless of whether cash flow is moderate

or extreme (as shown above in the results of model 3 and 4 and as posited in the research hypotheses, see chapter 5, section 5.4.3.2).

- Extreme working capital from operations leads to incremental information content for **moderate** cash flow from operations (as shown above in the results of model 3 and as posited in the research hypotheses, see chapter 5, section 5.4.3.2).
- Extreme working capital from operations does not lead to incremental information content for **extreme** cash flow from operations (as shown above in the results of model 4 and as posited in the research hypotheses, see chapter 5, section 5.4.3.2).

The above findings show that the results of recent U.S. studies that examined the effect of extreme earnings on the incremental information content of cash flow from operations and earnings (Cheng & Yang, 2003) are obtained when the effect of extreme working capital from operations on the incremental information content of cash flow and working capital from operations is examined²⁷².

Consistent with the previous analysis of the effect of extreme earnings on the incremental information content of cash flow and earnings from the perspective of the relative value relevance of cash flow component and total accruals component, additional analysis of the results of model 3 and model 4 from the perspective of the relative value relevance of cash flow component and current accruals component of working capital from operations now is considered²⁷³. Defining working capital from operations as the sum of a cash flow from operations component and current accruals component.,

- the implied summed coefficients of the level and change of cash flow can be calculated as the summed coefficients of the level and change of working capital from operations plus summed coefficients of the level and change of cash flow cash, and

²⁷² For details of the implications of these results see section, 6.5 later in this chapter

²⁷³ The above analysis is conducted for the mean of the summed yearly coefficients of the level and change in working capital from operations (cash flow) derived from annual regression. These results are still the same if the analysis is conducted for the summed coefficients of the level and change in working capital from operations (cash flow) in the case of the pooled regression.

- the implied summed coefficients of the level and change of current accruals can be calculated as the summed coefficients of the level and change of working capital from operations.

Using the above relations, in model 3 (results reported in table 6-9) when working capital from operations is moderate, the implied summed coefficients of the level and change of cash flow is 3.7 (i.e. $3.29 + 0.41$) and the implied summed coefficients of the level and change of current accruals is 3.29. When working capital from operations is extreme the implied summed coefficients of cash flow is 3.11 (i.e. $3.29 + 0.41 - 2.32 + 1.73$) and the implied summed coefficients of current accruals is 0.97 (i.e. $3.29 - 2.32$). It can be noted that, when working capital from operations is extreme, there is a much sharper fall in the summed coefficient for extreme current accruals component (71%²⁷⁴) than for moderate cash flow component (16%²⁷⁵). These results signify that **moderate** cash flow becomes more important than extreme current accruals when working capital from operations is extreme. This confirms the above results of model 3 regarding the existence of incremental information content of **moderate** cash flow when working capital from operations is extreme.

In model 4 (results reported in table 6-10), when working capital from operations is moderate, the implied summed coefficients of the level and change of cash flow is 2.23 (i.e. $2.34 - 0.11$) and the implied summed coefficients of the level and change of current accruals is 2.34. When working capital from operations is extreme, the implied summed coefficients of the level and change of cash flow is 1.05 (i.e. $2.34 - 0.11 - 1.33 + 0.15$) and the implied summed coefficients of the level and change of current accruals is 1.01 (i.e. $2.34 - 1.33$). It can be noted that, there is no obvious difference in the fall of the summed coefficient of extreme current accruals component (57%²⁷⁶) and extreme cash flow component (53%²⁷⁷) when working capital from operations is extreme. This means that **extreme** cash flow and extreme current accruals are equivalently informative. This confirms the above results of model 4 regarding the lack of evidence of

²⁷⁴ 71% = $(3.29 - 0.97) / 3.29$.

²⁷⁵ 16% = $(3.7 - 3.11) / 3.7$.

²⁷⁶ 57% = $(2.34 - 1.01) / 2.34$.

²⁷⁷ 53% = $(2.23 - 1.05) / 2.23$.

incremental information content of extreme cash flow when working capital from operations is extreme.

Therefore, from the above analysis and the results of models 3 and 4 which have been employed to examine the effect of extreme working capital from operations on the incremental information content of cash flow from operations and working capital from operations for a moderate cash flow sub-sample (model 3) and an extreme cash flow sub-sample (model 4), it can be stated that the following hypothesis is accepted:

- When working capital from operations is extreme the incremental information content of cash flow from operation exists only for moderate cash flow and not for extreme cash flow.

The accounting interpretation of these results, in terms of disclosure of working capital from operations components, reveal that moderate cash flow from operations and extreme current accruals are valued (associated with returns) differently from each other. In other words, these results indicate that moderate cash flow has a higher valuation than extreme current accruals. Hence, for a given amount of extreme working capital from operations, the stock market responds more favorably (and much sharper) to moderate cash flow from operations than extreme current accruals. Thus, investors prefer to observe both moderate cash flow from operations and extreme current accruals separately when working capital from operations is extreme. On the other hand, extreme cash flow from operations and extreme current accruals are valued (associated with returns) equivalently. Hence, for a given amount of extreme working capital from operations, the stock market responds equivalently to extreme cash flow from operations and extreme current accruals. Thus, investors did not prefer to observe extreme cash flow from operations and extreme current accruals separately when working capital from operations is extreme. This is because the two components are being valued equivalently and would not represent independent signals for the investor.

Table 6-9 The effect of the extremity of working capital from operations on the incremental information content of cash flow from operations and working capital from operations whilst controlling for the extremity of cash flow: contextual model with a dummy variable approach regression results for the sub-sample of moderate cash flow (model 3)

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \varepsilon_{it}$$

Coefficients (*t*-statistics)

Year	N	α_0	α_1	α_2	α_3	α_4	α_5	α_6	α_7	α_8	Sum of ($\alpha_1 + \alpha_3$)	Sum of ($\alpha_2 + \alpha_4$)	Sum of ($\alpha_5 + \alpha_7$)	Sum of ($\alpha_6 + \alpha_8$)	Adj. R^2
Panel A: cross-sectional regressions															
1996	558	-0.35	1.28	-0.35	2.35	0.12	-0.4	0.3	-2.18	1.97	3.63	-0.23	-2.58	2.27	0.23
1997	589	-0.49	1.37	-0.6	1.2	1.5	0.63	0.49	-1.12	0.4	2.57	0.9	-0.49	0.89	0.25
1998	569	-0.46	0.99	-0.57	1.95	1.12	0.55	0.1	-3.13	2.32	2.94	0.55	-2.58	2.42	0.23
1999	547	-0.21	2.01	-1.01	0.85	1.51	-1.48	0.69	-0.96	0.39	2.86	0.5	-2.44	1.08	0.15
2000	469	-0.31	0.04	0.31	3.68	-0.78	1.01	-0.06	-2.98	1.84	3.72	-0.47	-1.97	1.78	0.18
2001	468	-0.47	-0.18	-0.12	3.61	1.43	0.27	-0.48	-3.44	2.49	3.43	1.31	-3.17	2.01	0.34
2002	480	-0.38	0.09	0.21	3.76	0.07	-0.01	-0.16	-2.98	1.8	3.85	0.28	-2.99	1.64	0.3
Mean		-0.38	0.8	-0.31	2.49	0.71	0.08	0.13	-2.4	1.6	3.29	0.41	-2.32	1.73	0.24
<i>t</i> value		(-9.99)***	(2.56)**	(-1.71)*	(5.39)***	(2.07)**	(0.26)	(0.83)	(-6.32)***	(4.92)***	(17.63)***	(1.74)*	(-6.86)***	(7.95)***	

Panel B: pooled cross-sectional time-series regression

Pooled	3680	-0.4	0.64	-0.33	2.62	0.68	-0.22	0.18	-2.17	1.4	3.26	0.35	-2.39	1.58	0.21
<i>t</i> value		(-9.22)***	(1.91)*	(-1.91)*	(5.75)***	(1.8)*	(-0.68)	(0.91)	(-5.27)***	(3.83)***	(15.49)***	(1.21)	(-10.84)***	(6.42)***	

Notes

- N represents the number of firm-year observations for each year, and for the total number of observation respectively.
- R_{it} is the annual market adjusted stock return of firm *i* measured over the fifth month of year *t* to the fourth month of year *t* + 1.
- ΔE_{it} (E_{it}) is the change (level) in working capital from operations and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm *i* in year *t*. These variables are deflated by the market value of equity at the beginning of year *t*.
- Mean represents the mean of the 7 yearly coefficients, and the *t*-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
- Sum of ($\alpha_5 + \alpha_7$) is the sum of the estimated coefficients of the change and level of working capital from operations in the existence of its extremity.
- Sum of ($\alpha_6 + \alpha_8$) is the sum of the estimated coefficients of the change and level of moderate cash flow from operations conditioned on the extremity of working capital from operations.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- The whole sample of each year has been divided into two sub-samples: a moderate cash flow sub-sample and an extreme cash flow sub-sample. The sample in model 3 is the sub-sample of moderate cash flow from operations observations. The ratio of cash flow from operations to market value of equity at the end of year *t* used to determine moderate cash flow from operations. Moderate cash flow from operations is defined by dividing all firms in each year into nine groups depending upon the magnitude of the ratio of cash flow from operations to market value of equity at the end of year *t* with an approximately equal number of firms per group where the tenth group is assigned to firms with negative ratio of cash flow from operations to market value of equity at the end of year *t*. The middle six groups are considered as moderate cash flow from operations. Moderate cash flow from operations observations, in this sub-sample, are classified into two groups: moderate working capital from operations and extreme working capital from operations. The ratio of working capital from operations to market value of equity at the end of year *t* used to determine the two groups, all firms in each year are divided into nine groups depending upon the magnitude of the ratio of working capital from operations to market value of equity at the end of year *t* with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratio of working capital from operations to market value of equity at the end of year *t*. The middle six groups are classified as moderate and the other four groups are classified as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 6-10 The effect of the extremity of working capital from operations on the incremental information content of cash flow from operations and working capital from operations whilst controlling for the extremity of cash flow: contextual model with a dummy variable approach regression results for the sub-sample of extreme cash flow (model 4)

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \varepsilon_{it}$$

Coefficients (*t*-statistics)

Year	N	α_0	α_1	α_2	α_3	α_4	α_5	α_6	α_7	α_8	Sum of ($\alpha_1 + \alpha_3$)	Sum of ($\alpha_2 + \alpha_4$)	Sum of ($\alpha_5 + \alpha_7$)	Sum of ($\alpha_6 + \alpha_8$)	Adj. R^2
Panel A: cross-sectional regressions															
1996	363	-0.2	1.11	0.34	1.51	-0.65	-0.82	0.04	-1.07	0.34	2.62	-0.31	-1.89	0.38	0.12
1997	426	-0.45	0.8	-0.003	1.09	0.13	-0.29	-0.15	0.06	-0.57	1.89	0.127	-0.23	-0.72	0.17
1998	484	-0.41	0.82	0.05	1.54	-0.27	0.37	-0.21	-1.49	0.77	2.36	-0.22	-1.12	0.56	0.14
1999	437	0.03	1.63	-0.15	-0.34	0.05	-0.38	0.11	0.07	-0.28	1.29	-0.1	-0.31	-0.17	0.06
2000	431	-0.21	0.58	-0.09	1.34	-0.21	-0.2	0.21	-1.11	0.18	1.92	-0.3	-1.31	0.39	0.05
2001	524	-0.54	-0.4	0.15	3.73	0.02	0.43	-0.29	-2.98	0.84	3.33	0.17	-2.55	0.55	0.3
2002	524	-0.44	-0.07	0.31	3.03	-0.42	0.66	-0.59	-2.57	0.63	2.96	-0.11	-1.91	0.04	0.15
Mean		-0.32	0.64	0.09	1.7	-0.19	-0.03	-0.13	-1.3	0.27	2.34	-0.11	-1.33	0.15	0.14
<i>t</i> value		(-4.23)***	(2.45)**	(1.21)	(3.38)***	(-1.81)*	(-0.16)	(-1.22)	(-2.92)**	(1.35)	(8.86)***	(-1.46)*	(-4.1)***	(0.83)	
Panel B: pooled cross-sectional time-series regression															
Pooled	3189	-0.35	0.32	0.15	1.93	-0.2	0.28	-0.37	-1.69	0.57	2.25	-0.05	-1.41	0.2	0.12
<i>t</i> value		(-4.91)***	(0.99)	(1.58)	(3.56)***	(-2.68)***	(1.22)	(-4.31)***	(-3.98)***	(3.44)***	(8.75)***	(-0.79)	(-5.69)***	(1.24)	

Notes

- N represents the number of firm-year observations for each year, and for the total number of observation respectively.
- R_{it} is the annual market adjusted stock return of firm *i* measured over the fifth month of year *t* to the fourth month of year *t*+1.
- ΔE_{it} (E_{it}) is the change (level) in working capital from operations and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm *i* in year *t*. These variables are deflated by the market value of equity at the beginning of year *t*.
- Mean represents the mean of the 7 yearly coefficients, and the *t*-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
- Sum of ($\alpha_5 + \alpha_7$) is the sum of the estimated coefficients of the change and level of working capital from operations in the existence of its extremity.
- Sum of ($\alpha_6 + \alpha_8$) is the sum of the estimated coefficients of the change and level of extreme cash flow from operations conditioned on the extremity of working capital from operations.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- The whole sample of each year has been divided into two sub-samples: a moderate cash flow sub-sample and an extreme cash flow sub-sample. The sample in model 4 is the sub-sample of extreme cash flow from operations observations. The ratio of cash flow from operations to market value of equity at the end of year *t* used to determine extreme cash flow from operations. Extreme cash flow from operations is defined by dividing all firms in each year into nine groups depending upon the magnitude of the ratio of cash flow from operations to market value of equity at the end of year *t* with an approximately equal number of firms per group where the tenth group is assigned to firms with negative ratio of cash flow from operations to market value of equity at the end of year *t*. The first, second, ninth and tenth groups are considered as extreme are cash flow from operations. Extreme cash flow from operations observations, in this sub-sample, are classified into two groups: moderate working capital from operations and extreme working capital from operations. The ratio of working capital from operations to market value of equity at the end of year *t* used to determine the two groups; all firms in each year are divided into nine groups depending upon the magnitude of the ratio of working capital from operations to market value of equity at the end of year *t* with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratio of working capital from operations to market value of equity at the end of year *t*. The middle six groups are classified as moderate and the other four groups are classified as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

6.5 Summary and discussion of the results

The results of the first stage that examined the incremental information content of cash flow from operations and earnings followed by examining the effect of extreme earnings on the incremental information content of cash flow and earnings can be summarised as follows.

1. Earnings have incremental information beyond cash flow from operations.
2. Cash flow from operations has incremental information beyond earnings.
3. Extreme earnings have a smaller impact on abnormal returns irrespective of whether cash flow is moderate or extreme.
4. Extreme earnings lead to incremental information content for moderate cash flow from operations.
5. Extreme earnings did not lead to incremental information content for extreme cash flow from operations.

The results of the second stage that examined the incremental information content of cash flow from operations and working capital from operations followed by examining the effect of extreme working capital from operations on the incremental information content of cash flow and working capital from operations can be summarised as follows.

1. Working capital from operations has incremental information beyond cash flow from operations.
2. Cash flow from operations did not have incremental information content beyond working capital from operations.
3. Extreme working capital has a smaller impact on abnormal returns irrespective of whether cash flow is moderate or extreme.
4. Extreme working capital from operations leads to incremental information content for moderate cash flow from operations.
5. Extreme working capital from operations did not lead to incremental information content for extreme cash flow from operations.

With respect to examining the incremental information content of cash flow beyond (i) earnings (as in first stage), and (ii) working capital from operations (as in the second stage) and without considering the impact of the extremity of either earnings or working capital from operations on the incremental information content of cash flow, the results in the first stage showed that both cash flow from operations and earnings have incremental information content beyond each other (see section 6.3, tables 6.3 and 6.4). However, the results in the second stage indicated that working capital from operations has incremental information content beyond cash flow from operations and cash flow did not section (see section 6.4, tables 6.7 and 6.8). Together, these results did not support the decomposition of working capital from operations into its cash flow and current accruals components because cash flow is not highly valued than current accruals.

To ascertain from the above results, the standard model of examining the incremental information content of earnings, working capital from operations, and cash flow from operations has been estimated. Both the change model (random walk model) and the level and change combined model (the sum of the coefficients for the level and change in earnings, working capital from operations, and cash flow from operations is used for testing the incremental information content) have been used to test the incremental information content of earnings, working capital from operations, and cash flow from operations.

The following table, table 6-11, shows final sample size of the study for testing the incremental information content of earnings, working capital from operations, and cash flow from operations through the period of the study (1996 – 2002)²⁷⁸.

²⁷⁸ For further details of the criteria of determining the sample size of this study, see the data collection and sample selection in chapter 5, section 5.3. Because the study here examines the incremental information content of the three measures (earnings, working capital from operations, and cash flow from operations in one model), the sample size in the above table is slightly different from the numbers which have been employed to examine the separate two stages of this study. This is because non-available data and outliers have been excluded for all three measures together.

Table 6-11 Final sample size of the study for testing the incremental information content of earnings, working capital from operations, and cash flow from operations

Year	Total sample size	Firms excluded due to non-availability of required data	Outliers ²⁷⁹	Final sample size
1996	1916	943	58	915
1997	1916	835	69	1012
1998	1916	808	66	1042
1999	1916	876	62	978
2000	1916	962	65	889
2001	1916	870	60	986
2002	1916	853	67	996
Total of seven years	13412	6147	447	6818

In terms of firm year observations, this sample comprises 6818 of firm year observations for a sample of 1632 British firms over 7 year periods from 1996 to 2002 for testing the incremental information content of earnings, working capital from operations, and cash flow from operations.

The results of the change model used for testing the incremental information content of earnings, working capital from operations, and cash flow from operations are reported in table 6-12. Coefficients and statistics for (1) year-by-year, mean, and (2) pooled cross-sectional time-series regression results on the association of changes in earnings, changes in working capital from operations,

²⁷⁹ The two extreme percent of observations that lie above 99% and below 1% of the distribution of changes in earnings or working capital from operations or cash flow from operations or annual market adjusted return are considered as outliers and excluded from the sample.

and changes in cash flow from operations, and market adjusted return, for the period 1996-2002, are presented in panels A, and B respectively.

In panel A, the mean of the yearly coefficients of changes in earnings is **0.26** (**t statistics = 3.57**). The value of **0.26** is significantly positive at the 1% level. The mean of the yearly coefficients of changes in working capital from operations is **1.05** (**t = 6.52**). The value of **1.05** is significantly positive at the 1% level. The mean of the yearly coefficients of changes in cash flow from operations is **0.01** (**t = 0.19**). The value of **0.01** is positive but not significant at any conventional level. These results indicate incremental information content for both earnings, and working capital from operations beyond each other and beyond cash flow from operations. However, these results do not show incremental information content for cash flow from operation relative to earnings, and working capital from operations.

In panel B, the pooled analysis generates similar results. The coefficient of change in earnings is **0.25** (**t = 3.48**). The value of **0.25** is significantly positive at the 1% level. The coefficient of change in working capital from operations is **0.89** (**t = 6.21**). The value of **0.89** is significantly positive at the 1% level. The coefficient of change in cash flow is **0.02** (**t = 0.21**). The value of **0.02** is positive but not significant at any conventional level. Again, these results indicate incremental information content for only earnings, and working capital from operations beyond cash flow from operations and not for cash flow from operations beyond earnings and working capital flow from operations.

The results of the level and change combined model used for testing the incremental information content of earnings, working capital from operations, and cash flow from operations are reported in table 6-13. Coefficients and statistics for (1) year-by-year, mean, and (2) pooled cross-sectional time-series regression results on the association of the level and change in earnings, level and change in working capital from operations, level and change in cash flow from operations, and market adjusted return, for the period 1996-2002, are presented in Panels A, and B respectively.

The summed coefficients of the level and change in earnings (sum of α_1 and α_4) is significantly positive at the 1% level (0.51, $t = 13.88$, and 0.44, $t = 12.66$) for the annual regressions and pooled regression in panels A and B respectively. Again, and similar to the results of change model, these results show incremental information content for earnings beyond both working capital from operations, and cash flow from operations.

The summed coefficients of the level and change in working capital from operations (sum of α_2 and α_5) is significantly positive at the 1% level (1.14, $t = 14.57$, and 1.03, $t = 13.26$) for the annual regressions and pooled regression in panels A and B respectively. Again, and similar to the results of change model, these results suggest incremental information content for working capital from operations beyond both earnings, and cash flow from operations.

The summed coefficients of the level and change in cash flow from operations (sum of α_3 and α_6) is (0.12, $t = 1.36$, and 0.18, $t = 1.74$) for the annual regressions and pooled regression in panels A and B respectively. The value of 0.12 is positive but not significant at any conventional level. The value of 0.18 is significantly positive at 10%. These results indicate mixed and weak evidence of incremental information content for cash flow from operations beyond earnings and working capital from operations.

The results of the change model and change and level combined model employed to examine the incremental information content of earnings, working capital from operations, and cash flow from operations are consistent. These results lead to the same conclusion derived from the two stages together and suggest that cash flow from operations and current accruals are equivalently informative and hence disclosure of their sum which is working capital from operations is sufficient. On the other hand, these results contradicted the results of the first stage and the findings of recent U.S. studies (e.g., Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang, 2003; and among others) that examined and supported the incremental information content of cash flow only beyond earnings. In other words, the higher valuation of cash flow over total accruals did not hold (could not be generalised) regarding the higher valuation of cash flow from operations over current accruals.

The possible explanation of these results is that cash flow from operations has incremental information content only beyond earnings in the first stage not because it has higher valuation than current accruals, but because it is correlated with working capital from operations which is omitted from the regression equation. In addition, the less information content of non-current accruals component are the driving force behind the existence of incremental information content for cash flow from operations only beyond earnings in the first stage²⁸⁰.

Overall, these results reveal that working capital from operations is a better proxy for the underlying cash flow from operations (over the entire future horizon, not just the current period) than is cash flow from operations.

²⁸⁰ See chapter 1 for further details of the criticism of examining the incremental information content of cash flow from operations only beyond earnings and not beyond both earnings, and working capital from operations.

Table 6-12 The incremental information content of earnings, working capital from operations, and cash flow from operations: (change model): change in earnings, working capital from operations, and cash flow from operations

$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta WC_{it} + \alpha_{3t} \Delta CF_{it} + \varepsilon_{it}$ Coefficients (<i>t</i> -statistics)						
Year	<i>N</i>	α_0	α_1	α_2	α_3	<i>Adj.R</i> ²
Panel A: cross-sectional regressions						
1996	915	-0.1	0.21	1.15	0.05	0.09
1997	1012	-0.28	-0.05	1.52	-0.05	0.09
1998	1042	-0.23	0.32	1.51	0.06	0.1
1999	978	0.01	0.31	1.1	-0.14	0.07
2000	889	-0.07	0.25	1.07	-0.11	0.06
2001	986	-0.16	0.59	0.36	0.34	0.05
2002	996	-0.16	0.18	0.64	-0.07	0.03
Mean		-0.14	0.26	1.05	0.01	0.07
<i>t</i> value		(-3.82)***	(3.57)***	(6.52)***	(0.19)	
Panel B: pooled cross-sectional time-series regression						
pooled	6818	-0.14	0.25	0.89	0.02	0.05
<i>t</i> value		(-4.11)***	(3.48)***	(6.21)***	(0.21)	

- Notes:
- *N* represents the number of firm-year observations for each year, and for the total number of observation respectively.
 - R_{it} is the annual market adjusted stock return of firm *i* measured over the fifth month of year *t* to the fourth month of year *t*+1.
 - ΔE_{it} is the change in earnings, ΔWC_{it} is the change in working capital from operations and ΔCF_{it} is the change in cash flow from operations for firm *i* in year *t*. These variables are deflated by the market value of equity at the beginning of year *t*.
 - Mean represents the mean of the 7 yearly coefficients, and the *t*-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
 - In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
 - ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 6-13 The incremental information content of earnings, working capital from operations, and cash flow from operations: (level and change combined model): level and change of earnings, working capital from operations, and cash flow from operations

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta WC_{it} + \alpha_{3t} \Delta CF_{it} + \alpha_{4t} E_{it} + \alpha_{5t} WC_{it} + \alpha_{6t} CF_{it} + \varepsilon_{it}$$

Coefficients (*t*-statistics)

Year	N	α_0	α_1	α_2	α_3	α_4	α_5	α_6	Sum of ($\alpha_1 + \alpha_4$)	Sum of ($\alpha_2 + \alpha_5$)	Sum of ($\alpha_3 + \alpha_6$)	Adj. R^2
Panel A: cross-sectional regressions												
1996	915	-0.14	-0.06	0.99	0.12	0.48	0.26	-0.12	0.42	1.25	0	0.12
1997	1012	-0.36	-0.19	1.09	-0.2	0.79	0.2	0.25	0.6	1.29	0.05	0.17
1998	1042	-0.31	0.02	1.13	-0.05	0.56	0.29	0.22	0.58	1.42	0.17	0.15
1999	978	0.05	0.17	1.48	-0.23	0.21	-0.6	0.17	0.38	0.88	-0.06	0.08
2000	889	-0.1	0.03	0.67	-0.05	0.57	0.23	-0.08	0.6	0.9	-0.13	0.1
2001	986	-0.33	0.37	-0.34	-0.17	0.21	1.57	0.71	0.58	1.23	0.54	0.3
2002	996	-0.2	0.09	0.44	-0.12	0.34	0.59	0.37	0.43	1.03	0.25	0.18
Mean		-0.2	0.06	0.78	-0.1	0.45	0.36	0.22	0.51	1.14	0.12	0.16
<i>t</i> value		(-3.56)***	(0.92)	(3.46)***	(-2.22)**	(5.63)***	(1.49)*	(2.05)**	(13.88)***	(14.57)***	(1.36)	
Panel B: pooled cross-sectional time-series regression												
Pooled	6818	-0.22	0.13	0.58	-0.14	0.31	0.45	0.32	0.44	1.03	0.18	0.13
<i>t</i> value		(-3.9)***	(1.75)*	(2.25)**	(-2.49)**	(4.93)***	(1.53)	(3.12)***	(12.66)***	(13.26)***	(1.74)*	

Notes:

- N represents the number of firm-year observations for each year and for the total number of observation respectively.
- R_{it} is the annual market adjusted stock return of firm *i* measured over the fifth month of year *t* to the fourth month of year *t*+1.
- ΔE_{it} (E_{it}) is the change (level) in earnings, ΔWC_{it} (WC_{it}) is the change (level) in working capital from operations and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm *i* in year *t*. These variables are deflated by the market value of equity at the beginning of year *t*.
- Mean represents the mean of the 7 yearly coefficients, and the *t*-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3 143 (0.01 level), 1 943 (0.05 level) and 1 440 (0.10 level).
- Sum of ($\alpha_1 + \alpha_4$) is the sum of the estimated coefficients of the change and level of earnings.
- Sum of ($\alpha_2 + \alpha_5$) is the sum of the estimated coefficients of the change and level of the working capital from operations.
- Sum of ($\alpha_3 + \alpha_6$) is the sum of the estimated coefficients of the change and level of cash flow from operations.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 respectively.

We now turn to the issue of the effect of extreme earnings and extreme working capital from operations on the incremental information content of cash flow, the results of the first stage showed that extreme earnings lead to incremental information content only for moderate (not extreme) cash flow from operations. This means that moderate cash flow is more highly valued than extreme total accruals. These results are consistent with the findings of the recent U.S. study considered by Cheng & Yang (2003). In the second stage, the results were identical to the results of the first stage where extreme working capital from operations leads to incremental information content for moderate (not extreme) cash flow from operations. This means that moderate cash flow is more highly valued than extreme current accruals. Together, these results show that a higher market valuation for moderate cash flow from operations over extreme total accruals could be extended to the higher valuation of moderate cash flow from operations over extreme current accruals. In other words, these results mean that moderate cash flow is more highly valued than both extreme current accruals and extreme total accruals.

However, addressing the issue of the extremity in relation to the relative valuation of cash flow and total accrual contributes in achieving a higher differential valuation for cash flow over total accruals, but the superiority of valuation of cash flow over total accruals is already obtained regardless of whether earnings are extreme. In other words, cash flow has incremental information content only beyond earnings (as conducted in the first stage, see section 6.3.1 and 6.3.2 earlier in this chapter, and recent U.S. studies e.g., Cheng et al., 1996, Cheng et. al., 1997; Cheng & Yang, 2003) irrespective of whether earnings are extreme. The fundamental benefit of addressing the issue of the extremity lies behind the relative valuation of cash flow and current accruals. Without considering the issue of the effect of working capital extremity on the incremental information content of cash flow from operations, the results of second stage that started by examining the incremental information content of cash flow from operations and working capital from operations failed to provide evidence of differential higher valuations of cash flow over current accruals (see section 6.4.1 and 6.4.2 earlier in this chapter). As shown before these results are consistent with prior studies (e.g., in the U.S., Schaefer & Kenneley, 1986;

Bernard & Stober, 1989; Jennings, 1990; Ali 1994; Pfeiffer et al., 1998²⁸¹; and in the U.K., Board & Day, 1989; Board et al., 1989; Ali & Pope, 1995; Green 1999) and did not support a separate disclosure of cash flow and current accruals because both of them are equally informative. However, the superiority of valuation of cash flow over current accruals is demonstrated when considering the effect of extreme working capital from operation on the incremental information content of cash flow from operations. The reason is that the market will value the secondary measure, cash flow from operations, than the primary measure, working capital from operations, if this primary measure is extreme than the secondary measure.

In the light of the above discussion and as stated before in the introduction of this study, see chapter 1, about (i) the higher valuation of both current accruals and cash flow from operations than non-current accruals²⁸², and (ii) the weak evidence on the differential higher valuations of cash flow over current accruals without addressing the issue of working capital extremity (as confirmed from the results of the second stage see section 6.4.1 and 6.4.2 earlier in this chapter), the further discussion is focused on potential alternatives on the relation between working capital from operations and cash flow from operations under their extremity. This is to see in which situations the separate disclosure of cash flow from operations is value relevant taking into account the extremity of both cash flow and working capital from operations because there are higher valuation for cash flow over current accruals only when considering the issue of the effect of the extremity of working capital from operations on the incremental information content of cash flow from operations.

Depending upon the results of model 3 and 4 which were employed to examine the effect of extreme working capital from operations on the incremental information content of cash flow and working capital from operations (see

²⁸¹ Pfeiffer et al. (1998) reported a statistically significant differential valuation of cash flow and current accruals when they employed a pooled cross-sectional and time series data for estimating surprises in earnings, working capital from operations, and cash flow from operations.

²⁸² Non-current accruals are less valued than both current accruals and cash flow from operations. However, non-current accruals are considered informative component of earnings. See, for example; Rayburn (1986), Bowen et al. (1987), Jennings (1990), Pfeiffer et al. (1998), and Pfeiffer & Elgers (1999).

section 6.4.3 earlier in this chapter)²⁸³, it can be stated that the importance of cash flow from operations as a unique component of earnings for stock prices is affected by its extremity and conditioned on the extremity of working capital from operations as well. As such investors will face the following four different scenarios.

1. Moderate working capital from operations and moderate cash flow from operations.
2. Moderate working capital from operations and extreme cash flow from operations.
3. Extreme working capital from operations and moderate cash flow from operations.
4. Extreme working capital from operations and extreme cash flow from operations.

The sum of (α_1 and α_3) and the sum of (α_2 and α_4) presented in the results of the contextual model with a dummy variable approach employed to examine the effect of extreme working capital from operations on the incremental information content of cash flow from operations and working capital from operations for a **moderate** cash flow sub-sample²⁸⁴ (model 3) (as reported in table 6-9) depict **case 1**.

The sum of (α_1 and α_3) is the sum of the estimated coefficients of the change and level of working capital from operations when working capital from operations is moderate. This sum is **3.29** ($t = 17.63$) and **3.26** ($t = 15.49$) for the mean of annual regressions and pooled regression in panels A and B respectively. These values are significantly positive at the 1% level which reveal incremental information content of predominantly moderate working capital from operations.

²⁸³ For a robustness check see (i) the empirical results reported based on using the annual raw returns as a dependent variable in Appendix B (table B-7 and table B-8) and (ii) the empirical results reported based on using the absolute value of changes in cash flow from operations (working capital from operations) scaled by beginning price for measuring the extremity of cash flow from operations (working capital from operations) in Appendix C (table C-3 and C-4). The results were identical to those reported above.

²⁸⁴ See chapter 5, section 5.4.3 for a full discussion of model 3.

The sum of (α_2 and α_4) is the sum of the estimated coefficients of the change and level of **moderate** cash flow from operation when working capital from operations is moderate. This sum is **0.41** ($t = 1.74$) and **0.35** ($t = 1.21$) for the mean of annual regressions and pooled regression in panels A and B respectively. The value of **0.41** is significantly positive at the 10 % level. The value of **0.35** is positive but not significant at any conventional level. These results indicate that this is very weak and mixed evidence of the incremental information content of **moderate** cash flow from operations when working capital from operations is moderate.

The sum of (α_1 and α_3) and the sum of (α_2 and α_4) presented in the results of contextual model with a dummy variable approach employed to examine the effect of extreme working capital from operations on the incremental information content of cash flow from operations and working capital from operations for an **extreme** cash flow sub-sample²⁸⁵ (model 4) (as reported in table 6-10) depict **case 2**.

The sum of (α_1 and α_3) is the sum of the estimated coefficients of the change and level of working capital from operations when working capital from operations is moderate. This sum is **2.34** ($t = 8.86$) and **2.25** ($t = 8.75$) for the mean of annual regressions and pooled regression in panels A and B respectively. These values are significantly positive at the 1% level which suggest incremental information content of predominantly moderate working capital from operations.

The sum of (α_2 and α_4) is the sum of the estimated coefficients of the change and level of **extreme** cash flow from operation when working capital from operations is moderate. This sum is **-0.11** ($t = -1.46$) and **-0.05** ($t = -0.79$) for the mean of annual regressions and pooled regression in panels A and B respectively. The value of **-0.11** is significantly negative at the 10 % level; the value of **-0.05** is negative and not significant. These results suggest that there is no incremental information content of **extreme** cash flow from operations when working capital from operations is moderate.

In the light of the above results, it can be stated that, regarding cases 1 and 2 there is a lack of evidence of the incremental information content for either

²⁸⁵ See chapter 5, section 5.4.3 for a full discussion of model 4.

moderate or extreme cash flow from operations when working capital from operations is moderate. On other hand, there is incremental information content for moderate working capital from operations regardless of whether cash flow from operations is moderate or extreme.

As indicated earlier in this chapter (section 6.4.3.1 and table 6-9), there is, in case 3, evidence of incremental information content for moderate cash flow from operations when working capital from operations is extreme. Also and as indicated earlier in this chapter (section 6.4.3.2 and table 6-10), there is, in case 4, lack of evidence of incremental information content for extreme cash flow from operations when working capital from operations is extreme. Moreover, in cases 3 and 4, extreme working capital has a smaller impact on abnormal returns irrespective of whether cash flow is moderate or extreme.

From the four cases presented above, case 1, case 2, and case 4 did not support separate disclosure of working capital from operations into its components (current accruals and cash flow from operations). This is because both are equally informative. Only in case 3, when cash flow from operations is only moderate and working capital from operations is extreme, the incremental information content of cash flow from beyond working capital from operations is achieved and the separate disclosure of cash flow from operations is value relevant.

To sum up, without considering the impact of extreme working capital from operations on the incremental information content of moderate cash flow from operations, the separate disclosure of cash flow from operations is not value relevant. To interpret the results of the effect of extreme working capital from operations on the incremental information content of cash flow from operations for all these four cases together, given the higher valuation of both current accruals and cash flow from operations than non-current accruals, this study concludes that moderate cash flow becomes more important when working capital deviate because of measurement error or because of its limited information content caused by its extreme components. Overall, because working capital from operations is unlikely to persist to be permanent across the

years, the results of this study generally provide strong evidence for the usefulness of disclosing cash flow data in addition to accruals data.

In the end it should be clear that making financial reporting decisions based solely on associations with security returns is problematic because reported financial data may be used for purposes other (e.g., risk analysis, capability of meeting interest payments) than estimating the value of stock. The results of this study, however, indicate that cash flow becomes more important for valuation as accruals get 'noisy'. These results can be interpreted as indicating that cash flow and accruals are used jointly by investors with one being more important than the other depending on the relative 'extremeness' of each. Therefore, both are of value to the investor and both should be reported.

Chapter 7: Summary and conclusions

7.1 Introduction

7.2 Summary and implications of the results

7.3 Recommendations for future research

Chapter 7: Summary and conclusions

7.1 Introduction

Published in the 1980s, the earliest studies on the incremental information content of cash flow from operations and earnings reported mixed and inconclusive results on the incremental information content of cash flow and for its role in security valuation (e.g., in the U.S., Schaefer & Kenneley, 1986; Wilson, 1986 & 1987; Rayburn, 1986; Bowen et al., 1987; Bernard & Stober, 1989; and in the U.K., Board & Day, 1989; Board et al., 1989).

The focus of recent U.S. work on the incremental information content of cash flow and earnings (e.g., Ali, 1994; Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang, 2003; among others) has been distinguished by using a research methodology that incorporates conceptual factors which may be relevant to clarifying the role of cash flow and earnings in explaining security returns. This line of research was triggered by earnings return relationship studies which suggested that the magnitude of earnings response coefficient may be affected by a number of factors such as earnings permanence (Charitou et al, 2001).

More specifically, recent U.S. work on the incremental information content of cash flow and earnings explored the effect of extreme earnings on the incremental information content of cash flow from operations and earnings and it developed a more accurate proxy for the unexpected amount of cash flow and earnings. The levels and changes have been employed as proxies for surprises in earnings and cash flow. Furthermore, extreme components of cash flow from operations and earnings²⁸⁶ have been isolated apart from moderate ones based on that these extreme earnings and cash flow have limited information content (Cheng & Yang, 2003). This recent work on the incremental information content of cash flow and earnings provides significant results regarding the incremental information of cash flow beyond that contained in earnings, especially, in the

²⁸⁶ In this study, and following Cheng & Yang (2003), the terms moderate and permanent, and the terms extreme and transitory have been used interchangeably. For further details of these terms and their implications for market based accounting research (MBAR) studies, see chapter 3, section 3.4.2.

case of studies that have examined the effect of earnings extremity on the incremental information content of cash flow from operations and earnings (e.g., in the U.S., Ali, 1994; Cheng et al., 1996; Cheng & Yang, 2003; and in the U.K., Garrod & Hadi, 1998; Green, 1999; Charitou et al., 2001).

Along the same lines as recent U.S. research on the incremental information content of cash flow and earnings and based on U.K. data, this study has examined the securities market's differential pricing of earnings components affected by their extremity.

This chapter is divided into the following two sections: summary and implications of the results followed by recommendations for future research.

7.2 Summary and implications of the results

This study has re-examined the incremental information content of earnings, working capital from operations, and cash flow from operations affected by their extremity. The analysis was conducted in two separate stages.

7.2 .1 Stage 1

In the first stage and following recent U.S. work (e.g., Ali, 1994; Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang, 2003; among others), the study investigated the incremental information content of cash flow from operations and earnings to assess whether cash flow from operations and total accruals are valued differentially. This was followed by an examination of the effect of extreme earnings on the incremental information content of cash flow from operations to assess whether extreme earnings lead to incremental information content for cash flow from operations. The distinguishing features of the first stage in comparison with prior U.K work in this area are:

1. This study examined the incremental information content of cash flow and earnings by employing actual cash flow data derived from cash flow statements. All prior published U.K. studies employed estimated figures for cash flow data. Employing actual cash flow data as recommended by Bahnson et al. (1996) eliminates the need to develop a proxy for cash flow and avoid the articulation problem and the measurement errors in the

estimated figures of cash flow from operations employed in prior U.K. research.

2. This study controlled for the extremity of cash flow itself whilst examining the effect of earnings extremity on the incremental information content of cash flow and earnings²⁸⁷. Without controlling for the extremity of cash flow, the studies may fail to find incremental information content for cash flow (Cheng & Yang, 2003). This is because extreme cash flow is less informative than moderate cash flow (Ali, 1994). The U.S. study of Cheng & Yang (2003) was followed in order to assess the effect of extreme earnings on the incremental information content of cash flow and earnings.
3. This study has employed a large sample size and a more recent period. The sample size was 6851 firm year observations for a sample of 1634 British firms over 7 year periods from 1996 to 2002.

Both the change model (random walk model) (model 1) and the level and change combined model (model 2) (the sum of the coefficients for the level and change in earnings and cash flow from operations is used for testing the incremental information content. In this chapter, the summed (level and change) coefficients are referred to simply as coefficient for ease of discussion) have been used to test the incremental information content of cash flow from operations and earnings. Further analysis focused on the level and change combined model where contextual models with a dummy variable approach (models 3 and 4) have been employed to examine the effect of extreme earnings on the incremental information content of cash flow from operations and earnings. Model 3 has been used to examine the effect of extreme earnings on the incremental information content of cash flow from operations and earnings for a moderate cash flow sub-sample. Model 4 has been used to examine the effect of extreme

²⁸⁷ This means that this study isolated extreme cash flow from operations apart from moderate ones when examining the effect of extreme earnings on the incremental information content of cash flow and earnings.

earnings on the incremental information content of cash flow from operations and earnings for an extreme cash flow sub-sample²⁸⁸.

The findings of the first stage were as follows.

1. Earnings have incremental information content beyond cash flow from operations. The coefficient on earnings was positive and significant at the 1 % level by using either the mean of the yearly coefficients derived from yearly cross-sectional regressions or the pooled regression for both the random walk model (model 1) and the change and level combined model (model 2).
2. Cash flow from operations has incremental information content beyond earnings. The coefficient on cash flow from operations was positive and significant at 1 % by using either the mean of the yearly coefficients derived from yearly cross-sectional regressions or the pooled regression for both random walk model (model 1) and the change and level combined model (model 2).

These results remain qualitatively the same when using either annual market adjusted stock returns or annual raw stock returns²⁸⁹ as a dependent variable.

The above results are consistent with the findings of the recent U.S. studies by Cheng et al. (1996), Cheng et al. (1997), and Cheng & Yang (2003) and confirm that both earnings and cash flow from operations have incremental information content.

The accounting interpretation of these results, in terms of disclosure of earnings components, reveal that cash flow from operations and total accruals are valued (associated with returns) differently from each other. In other words, these results indicate that cash flow from operations has higher valuation than total accruals. Hence, for a given amount of earnings, the stock market responds more favorably to cash flow from operations than total accruals. Thus, investors prefer to observe both cash flow from operations and total accruals separately.

²⁸⁸ See chapter 5, section 5.4.3 for a full discussion of these four models.

²⁸⁹ See Appendix B for the results reported based on using the annual raw returns as a dependent variable.

3. Extreme earnings have a negative and significant impact on abnormal returns regardless of whether cash flow is moderate or extreme. The coefficient on extreme earnings was negative and significant at the 1 % level by using either the mean of the yearly coefficients derived from yearly cross-sectional regressions or the pooled regression for both the two contextual models with a dummy variable approach (model 3 and model 4).

These results remain qualitatively the same when using either annual market adjusted stock returns or annual raw stock returns²⁹⁰ as a dependent variable. Also, these results are unaltered when earnings extremity is measured by earnings to price ratios or when measured by the absolute value of changes in earnings scaled by beginning price²⁹¹.

4. Extreme earnings lead to incremental information content for moderate cash flow from operations. The coefficient on moderate cash flow when earnings are extreme was positive and significant at the 1 % level by using either the mean of the yearly coefficients derived from yearly cross-sectional regressions or the pooled regression for the contextual model with a dummy variable approach for the sub-sample of moderate cash flow (model 3). This result was obtained when earnings (cash flow) extremity is measured by earnings (cash flow) to price ratios. These results remain qualitatively the same when using annual market adjusted stock returns or annual raw stock returns²⁹² as a dependent variable.

However, when the extremity of earnings (cash flow) was measured by the absolute value of changes in earnings (cash flow) scaled by beginning price²⁹³ the results were not strong enough; where the coefficient on moderate cash flow was positive and not significant based on cross-temporal *t*-statistics and positive and significant at the 5% level based on pooled regression. These results reveal

²⁹⁰ See Appendix B for the results reported based on using the annual raw returns as a dependent variable.

²⁹¹ See Appendix C for the results reported based on using the absolute value of changes in earnings scaled by beginning price for measuring earnings extremity.

²⁹² See Appendix B for the results reported based on using the annual raw stock return as a dependent variable.

²⁹³ See Appendix C for the results reported based on using the absolute value of changes in earnings (cash flow) scaled by beginning price for measuring earnings (cash flow) extremity.

that measuring earnings (cash flow) extremity by earnings (cash flow) to price ratios is superior to measuring earnings (cash flow) extremity by the absolute value of changes in earnings (cash flow) scaled by beginning price for detecting incremental information content for moderate cash flow in the presence of extreme earnings.

5. Extreme earnings do not lead to incremental information content for extreme cash flow from operations. The coefficient on extreme cash flow when earnings are extreme was positive but not significant when using either the mean of the yearly coefficients derived from yearly cross-sectional regressions or the pooled regression for contextual model with a dummy variable approach for the sub-sample of extreme cash flow (model 4). This result was obtained when earnings (cash flow) extremity is measured by the absolute value of changes in earnings (cash flow) scaled by beginning price²⁹⁴.

However, when the extremity of earnings (cash flow) was measured by earnings (cash flow) to price ratios, the above result was not strong enough; where the coefficient on extreme cash flow when earnings are extreme was positive and significant at the 10% level of significance based on cross-temporal *t*-statistics (for either annual market adjusted returns or annual raw stock returns²⁹⁵ when employed as a dependent variable) and positive and significant at the 5% based on pooled regression for annual market adjusted returns as a dependent variable and positive and significant at the 10% level for annual raw stock returns²⁹⁶ when employed as a dependent variable. These results indicate that there is a little evidence of incremental information content for extreme cash flow from operations when earnings are extreme.

In general, the results of the effect of extreme earnings on the incremental information content of cash flow from operations indicate that extreme earnings lead to incremental information content only for moderate cash flow and not for

²⁹⁴ See Appendix C for the results reported based on using the absolute value of changes in earnings (cash flow) scaled by beginning price for measuring earnings (cash flow) extremity.

²⁹⁵ See Appendix B for the results reported based on using the annual raw returns as a dependent variable.

²⁹⁶ See Appendix B for the results reported based on using the annual raw returns as a dependent variable.

extreme cash flow. These results are consistent with the findings of the U.S. study by Cheng & Yang (2003).

The accounting interpretation of these results, in terms of disclosure of earnings components, reveal that moderate cash flow from operations and extreme total accruals are valued (associated with returns) differently from each other. In other words, these results indicate that moderate cash flow has higher valuation than extreme total accruals. Hence, for a given amount of extreme earnings, the stock market responds more favorably and much more sharply to moderate cash flow from operations than extreme total accruals. Thus, investors prefer to observe both moderate cash flow from operations and extreme total accruals separately when earnings are extreme. On the other hand, extreme cash flow from operations and extreme total accruals are valued (associated with returns) equivalently. Hence, for a given amount of extreme earnings, the stock market responds equivalently to extreme cash flow from operations and extreme total accruals. Thus, investors do not prefer to observe extreme cash flow from operations and extreme total accruals separately when earnings are extreme. This is because the two components are being valued equivalently and do not represent independent signals for the investor

In summary, the results of the first stage that examined the incremental information content of cash flow and earnings and the effect of extreme earnings on the incremental information content of cash flow from operations and earnings were consistent with the findings of the recent U.S. studies by Ali (1994), Cheng et al. (1996), Cheng et al. (1997), and Cheng & Yang (2003).

7.2 .2 Stage 2

With respect to the second stage, research on the incremental information content of earnings and cash flow is primarily concerned with the issue of the relative valuation of the cash flow and accrual components of earnings i.e., operating cash flow, current accruals, and non-current accruals (Clubb, 2003). Prior research in this area provided strong evidence for the higher market valuation for both cash flow from operations and current accruals over non-

current accruals. However, the evidence on the higher market valuation for cash flow over current accruals was weak and inconsistent (e.g., in the U.S., Schaefer & Kenneley, 1986; Bernard & Stober, 1989; Ali, 1994; and in the U.K., Board & Day, 1989; Board et al., 1989; Ali & Pope, 1994 & 1995; Green, 1999; Charitou et al., 2001).

The results of the first stage showed that cash flow from operations has a higher market valuation than total accruals. Given (i) the higher valuation of both current accruals and cash flow from operations than non-current accruals²⁹⁷ (this issue has been widely documented see for example Rayburn, 1986; Wilson, 1986 & 1987; Pfeiffer et al., 1998; Pfeiffer & Elgers, 1999), and (ii) the weak evidence on the differential higher valuations of cash flow over current accruals (see, for example, in the U.S., Rayburn, 1986; Bernard & Stober, 1989; Jennings, 1990; Ali, 1994; Pfeiffer et al., 1998²⁹⁸ and in the U.K., Board & Day, 1989; Board et al., 1989; Ali & Pope, 1994 & 1995; Green, 1999), the results of the first stage are subject to alternative interpretations. Either cash flow may be more informative than current accruals, or both cash flow and current accruals are equivalently informative. To distinguish between these two alternatives and in order to assess the generality of recent U.S. findings that examined the incremental information content of cash flow from operations and earnings, as conducted in the first stage, the second stage investigated the incremental information content of cash flow from operations and working capital from operations in separate empirical models to assess whether cash flow from operations and current accruals are valued differentially. This is followed by an extension to Cheng & Yang's U.S. study (2003) that examined the effect of extreme earnings on the incremental information content of cash flow and earnings via an examination of the effect of extreme working capital from operations on the incremental information content of cash flow from operations

²⁹⁷ Non-current accruals are less valued than both current accruals and cash flow from operations. However, non-current accruals are considered informative component of earnings. See, for example; Rayburn (1986), Bowen et al. (1987), Jennings (1990), Pfeiffer et al. (1998), and Pfeiffer & Elgers (1999).

²⁹⁸ Pfeiffer et al., (1998) reported a statistically significant differential valuation of cash flow and current accruals when they employed a pooled cross-sectional and time series data for estimating surprises in earnings, working capital from operations, and cash flow from operations.

to assess whether extreme working capital from operations lead to any incremental information content for cash flow from operations.

Both the change model (random walk model) (model 1) and the level and change combined model (model 2) (the sum of the coefficients for the level and change in working capital from operations and cash flow from operations is used for testing the incremental information content. In this chapter, the summed (level and change) coefficients are referred to simply as coefficient for ease of discussion) have been used to test the incremental information content of cash flow from operations and working capital from operations. Further analysis focused on the level and change combined model where contextual models with a dummy variable approach (models 3 and 4) were employed to examine the effect of extreme working capital from operations on the incremental information content of cash flow from operations and working capital from operations. Model 3 was employed to examine the effect of extreme working capital from operations on the incremental information content of cash flow from operations and working capital from operations for the moderate cash flow sub-sample. Model 4 was employed to examine the effect of extreme working capital from operations on the incremental information content of cash flow from operations and working capital from operations for the extreme cash flow sub-sample²⁹⁹.

The findings of the second stage were as follows.

1. Working capital from operations has incremental information content beyond cash flow from operations. The coefficient on working capital from operations was positive and significant at the 1 % level by using either the mean of the yearly coefficients derived from yearly cross-sectional regressions or the pooled regression for both the random walk model (model 1) and the change and level combined model (model 2).
2. Cash flow from operations did not have incremental information content beyond working capital from operations. The coefficient on cash flow from operations was negative and not significant using either the mean of the yearly coefficients derived from yearly cross-sectional regressions or

²⁹⁹ See chapter 5, section 5.4.3 for a full discussion of these four models.

the pooled regression for random walk model (model 1). This coefficient was positive but not significant for the change and level combined model (model 2).

These results remain qualitatively the same when using either market adjusted stock returns or annual market raw returns³⁰⁰ as a dependent variable.

The above results show that working capital from operations has incremental information content beyond cash flow from operations whereas cash flow from operations did not have incremental information content beyond working capital from operations. These findings are consistent with the majority of prior studies on evaluating the disclosures of earnings components (e.g., in the U.S., Schaefer & Kenneley, 1986; Bernard & Stober, 1989; Jennings, 1990; Ali 1994; Pfeiffer et al., 1998³⁰¹; and in the U.K., Board & Day, 1989; Board et al., 1989; Ali & Pope 1995, Green 1999). However, these findings contradict recent U.S. findings, as shown in the first stage, that showed a higher valuation of cash flow versus total accruals (e.g., Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang, 2003) and reveal that these findings could not be generalised to the higher valuation of cash flow over current accruals³⁰².

The accounting interpretation of these results, in terms of disclosure of working capital from operations components, reveals that cash flow from operations and current accruals are valued (associated with returns) equivalently. Hence, for a given amount of working capital from operations, the stock market responds equivalently to cash flow from operations and current accruals. Thus, disclosure of their sum which is working capital from operations is sufficient because investors are indifferent to which components contributed more or less to working capital from operations.

3. Extreme working capital from operations has a negative and significant impact on abnormal returns regardless of whether cash flow is moderate or extreme. The coefficient on extreme working capital from operations

³⁰⁰ See Appendix B for the results reported based on using the annual raw returns as a dependent variable.

³⁰¹ Pfeiffer et al., (1998) reported a statistically significant differential valuation of cash flow and current accruals when they employed a pooled cross-sectional and time series data for estimating surprises in earnings, working capital from operations, and cash flow from operations.

³⁰² For explanation of these results, see section 7.2.3 later in this chapter.

was negative and significant at the 1 % level by using either the mean of the yearly coefficients derived from yearly cross-sectional regressions or the pooled regression for both the two contextual models with a dummy variable approach (models 3 and 4).

These results remain qualitatively the same whether using market adjusted stock returns or annual market raw returns³⁰³ as a dependent variable. In addition, the results are unaltered when working capital from operations extremity is measured by working capital from operations to price ratios or when is measured by the absolute value of changes in working capital from operations scaled by beginning price³⁰⁴.

4. Extreme working capital from operations leads to incremental information content for moderate cash flow from operations. The coefficient on moderate cash flow when working capital from operations is extreme was positive and significant at the 1 % level by using either the mean of the yearly coefficients derived from yearly cross-sectional regressions or the pooled regression for contextual model with a dummy variable approach for the sub-sample of moderate cash flow (model 3).

These results remain qualitatively the same whether using market adjusted stock returns or annual market raw returns³⁰⁵ as a dependent variable. Furthermore, these results are unaltered when working capital from operations (cash flow from operations) extremity is measured by working capital from operations (cash flow from operations) to price ratios or when working capital from operation (cash flow from operations) extremity is measured by the absolute value of changes in working capital from operations (cash flow from operations) scaled by beginning price³⁰⁶.

³⁰³ See Appendix B for the results reported based on using the annual raw returns as a dependent variable.

³⁰⁴ See Appendix C for the results reported based on using the absolute value of changes in working capital from operations scaled by beginning price for measuring working capital from operations extremity.

³⁰⁵ See Appendix B for the results reported based on using the annual raw return as a dependent variable.

³⁰⁶ See Appendix C for the results reported based on using the absolute value of changes in working capital from operations (cash flow from operations) scaled by beginning price for measuring working capital from operations (cash flow from operations) extremity.

5. Extreme working capital from operations does not lead to incremental information content for extreme cash flow from operations. The coefficient on extreme cash flow when working capital from operations is extreme was positive but not significant using either the mean of the yearly coefficients derived from yearly cross-sectional regressions or the pooled regression for contextual model with a dummy variable approach for the sub-sample of extreme cash flow (model 4).

These results remain qualitatively the same whether using annual market adjusted stock returns or annual market raw returns³⁰⁷ as a dependent variable. Furthermore, these results remain unaltered when working capital from operations (cash flow from operations) extremity is measured by working capital from operations (cash flow from operations) to price ratios or when working capital from operation (cash flow from operations) extremity is measured by the absolute value of changes in working capital from operations (cash flow from operations) scaled by beginning price³⁰⁸. However, when the extremity was measured by the absolute value of changes scaled by beginning price, the coefficient on extreme cash flow when working capital from operations is extreme was negative and not significant.

In general, the results of the effect of extreme working capital from operations on the incremental information content of cash flow from operations indicate that extreme working capital from operations leads to incremental information content only for moderate cash flow and not for extreme cash flow. The above findings show that the results of recent U.S. studies that examined the effect of extreme earnings on the incremental information content of cash flow from operations and earnings (Cheng & Yang, 2003) are obtained when the effect of extreme working capital from operations on the incremental information content of cash flow and working capital from operations is examined³⁰⁹.

³⁰⁷ See Appendix B for the results reported based on using the annual raw return as a dependent variable.

³⁰⁸ See Appendix C for the results reported based on using the absolute value of changes in working capital from operations (cash flow from operations) scaled by beginning price for measuring working capital from operations (cash flow from operations) extremity.

³⁰⁹ For details of the implications of these results, see section 7.2.3 later in this chapter.

The accounting interpretation of these results, in terms of disclosure of working capital from operations components, reveals that moderate cash flow from operations and extreme current accruals are valued (associated with returns) differently from each other. In other words, these results indicate that moderate cash flow has higher valuation than extreme current accruals. Hence, for a given amount of extreme working capital from operations, the stock market responds more favorably (and much more sharply) to moderate cash flow from operations than extreme current accruals. Thus, investors prefer to observe both moderate cash flow from operations and extreme current accruals separately when working capital from operations is extreme. On the other hand, extreme cash flow from operations and extreme current accruals are valued (associated with returns) equivalently. Hence, for a given amount of extreme working capital from operations, the stock market responds equivalently to extreme cash flow from operations and extreme current accruals. Thus, investors did not prefer to observe extreme cash flow from operations and extreme current accruals separately when working capital from operations is extreme. This is because the two components are being valued equivalently, and do not represent independent signals for the investor.

7.2.3 Combining the results of stage 1 and stage 2

The results of the first and second stage can be summarised as follows.

1. Cash flow from operations has incremental information beyond earnings.
2. Earnings have incremental information beyond cash flow from operations.
3. Working capital from operations has incremental information content beyond cash flow from operations.
4. Cash flow from operations did not have incremental information content beyond working capital from operations.

5. Extreme earnings have a negative impact on abnormal returns irrespective of whether cash flow is moderate or extreme.
6. Extreme earnings lead to incremental information content for moderate cash flow from operations.
7. Extreme earnings did not lead to incremental information content for extreme cash flow from operations.
8. Extreme working capital has a negative impact on abnormal returns irrespective of whether cash flow is moderate or extreme.
9. Extreme working capital from operations leads to incremental information content for moderate cash flow from operations.
10. Extreme working capital from operations did not lead to incremental information content for extreme cash flow from operations.

In the first stage, the results showed that both cash flow from operations and earnings have incremental information content beyond each other. However, the results in the second stage indicated that working capital from operations has incremental information content beyond cash flow from operations and cash flow did not. Together, these results did not support the decomposition of working capital from operations into its cash flow and current accruals components because cash flow is not highly valued than current accruals.

To ascertain from the above results, the standard model of examining the incremental information content of earnings, working capital from operations, and cash flow from operations has been estimated. The results showed that both earnings and working capital from operations have incremental information content whereas cash flow from operations did not. The coefficient on either earnings or working capital from operations was positive and significant at the 1 % level by using either the mean of the yearly coefficients derived from yearly cross-sectional regressions or the pooled regression for both the random walk model and the change and level combined model³¹⁰ and at the same time, the

³¹⁰ This section referred to the summed (level and change) coefficients simply as coefficient for ease of discussion.

coefficient on cash flow from operations was positive but not significant using either the mean of the yearly coefficients derived from yearly cross-sectional regressions or the pooled regression in the case of the random walk model. This coefficient was positive but not significant based on the mean of the yearly coefficients derived from yearly cross-sectional regressions and positive and significant at 10% level based on pooled regression in the case of level and change combined model. This mixed evidence derived from the coefficient of cash flow does not support that cash flow from operations has incremental information content beyond both earnings and working capital from operations.

These results confirm the above conclusion derived from the two stages together, and suggest that cash flow from operations and current accruals are equivalently informative. Hence, disclosure of their sum which is working capital from operations is sufficient. On other hand, these results contradicted the results of the first stage and the findings of the recent U.S. studies (Cheng et al., 1996; Cheng et al., 1997; Cheng & Yang, 2003) which examined and supported the incremental information content of cash flow only behind earnings. The possible explanation of these results is that cash flow from operations has incremental information content only beyond earnings in the first stage not because it has higher valuation than current accruals, but because it is correlated with working capital from operations which is omitted from the regression equation. In addition, the lower information content of non-current accruals component are the driving force beyond the existence of incremental information content for cash flow from operations only beyond earnings in the first stage³¹¹. Overall, these results reveal that working capital from operations is a better proxy for the underlying cash flow from operations (over the entire future horizon, not just the current period) than is cash flow from operations.

In respect to the effect of extreme earnings and extreme working capital from operations on the incremental information of cash flow, the results of the first stage showed that extreme earnings lead to incremental information content only for moderate (not extreme) cash flow from operations. These results are

³¹¹ See chapter 1 for more details of the criticism of examining the incremental information content of cash flow from operations only beyond earnings and not beyond both earnings, and working capital from operations.

consistent with the findings of the recent U.S. study by Cheng & Yang (2003). In the second stage, the results were identical to the results of the first stage where extreme working capital from operations leads to incremental information content for moderate (not extreme) cash flow from operations. Together, these results show that a higher market valuation for moderate cash flow from operations over extreme total accruals could be generalised regarding the higher valuation of moderate cash flow from operations over extreme current accruals. These results mean that moderate cash flow is more highly valued than both extreme current accruals and extreme total accruals.

The higher valuation of cash flow over total accruals is obtained regardless of whether earnings are extreme (as shown in the results of first stage, cash flow has incremental information content beyond earnings even without addressing the issue of the effect of extreme earnings on the incremental information content of cash flow). Therefore, the basic story of addressing the issue of the extremity lies behind the relative valuation of cash flow and current accruals. The higher valuation of cash flow over current accruals did not exist without considering the effect of extreme working capital from operations on the incremental information content of cash flow (as shown in the results of second stage, cash flow has incremental information content beyond working capital only when working capital is extreme and cash flow is moderate). Given the higher valuation of both current accruals and cash flow from operations than non-current accruals, these results reveal that, when cash flow from operations is only moderate (and not extreme), the decomposition of working capital from operations into its current accruals and cash flow from operations components is value relevant and is conditioned on the presence of the extremity of working capital from operations.

In summary, given the higher valuation of both current accruals and cash flow from operations than non-current accruals, without considering the impact of extreme working capital from operations on the incremental information content of cash flow from operations, the separate disclosure of cash flow from operations is not value relevant. However, in the light of the above results of the effect of extreme working capital from operations on the incremental information content of cash flow from operations, this study concludes that moderate cash flow becomes more important when working capital deviates because of

measurement error or because of its limited incremental information content caused by its extreme components. Overall, because working capital from operations is unlikely to persist to be permanent across the years, the results of this study in general provide strong evidence for the usefulness of disclosing cash flow data in addition to accruals data. Therefore, earnings components i.e. cash flow from operations, current accruals, and non-current accruals help investor to make more informed decisions than would be made with earnings alone.

In the end, it should be clear that making financial reporting decisions based solely on associations with security returns is problematic. This is because reported financial data may be used for purposes other than estimating the value of stock (e.g., risk analysis, capability of meeting interest payments). The results of this study, however, indicate that cash flow become more important for valuation as accruals get 'noisy'. These results can be interpreted as indicating that cash flow and accruals are used jointly by investors with one being more important than the other depending on the relative 'extremeness' of each. Therefore, both are of value to the investor, and both should be reported.

7.3 Recommendations for future research

There are various potential areas for future research regarding the information content of cash flow data.

First, it is possible to expect the securities market's differential pricing of earnings components to vary across companies' economic circumstances. Consequently, the power of tests could be increased by exploiting these differences in the experimental design. Therefore, the results of this study on cash flow might potentially be enhanced by focusing on industries or situations in which earnings or working capital from operations tends to be noisy.

Second, future research on evaluating the disclosures of earnings components can move to different settings. For example, it would be interesting to pick up a corporate event and examine how the market valuation to those components shifts around the event. Examples of such events are equity offerings, debt offerings, bankruptcy, and takeovers.

Third, future research in this area might consider time series analysis as an alternative proxy for estimating unexpected amounts of earnings, working capital from operations, and cash flow to produce robust results of incremental information content of earnings, working capital from operations, and cash flow from operations. Pfeiffer et al. (1998) employed pooled cross-sectional and time series data for estimating surprises in earnings, working capital from operations, and cash flow from operations.

Fourth, the common belief is that cash flow information is superior to accrual information in evaluating a firm's liquidity and solvency. It is known that cash flow information is more closely related to recent operations & liquidity and earnings are more closely related to long-term profitability. Cash flow accounting, as implied by its name, focuses on liquidity and solvency, rather than on income measurement. It is expected that solvency variables to be more important for distressed firms, liquidity variables for start-ups, high-growth firms and firms with low debt ratings, and profitability variables for more mature stable firms. It is possible to assess whether cash flow or accrual measures of liquidity and solvency are more important than one another or whether they are complementary. In order to conduct that, we have to establish a reason why liquidity and solvency would logically be related to returns. We might argue that liquidity and solvency could affect risk, and risk could affect return. Then, research would have to prove that empirically there is a relation between returns and both cash flow based measures of liquidity and solvency and their accrual counterparts. Because, liquidity and solvency ratios are risk measures; they are not information flow like earnings or cash flows, it will be required to control for other things that to be related to returns (to avoid correlated omitted variables). This would likely need to include earnings and its components in regression equation. Once we have established (hopefully) that liquidity or solvency is an incrementally important variable, the issue of whether cash- or accrual-based measures of liquidity or solvency are more important than one another or whether they are complementary can then be addressed. When conducting such an analysis, research would have to deal with a main question; for example regarding liquidity, whether the measure of liquidity examined truly represents liquidity. There is no perfect fixes for this problem. This issue can be addressed

by trying many different liquidity constructs or creating factors of the different liquidity constructs.

Fifth, since the time series behavior of the cash flow is in marked contrast to the models typically employed for accounting earnings, further research on prediction of future cash flow need to delineate precisely the time series properties and predictive ability of cash flow expectation models. Additional refinements of cash flow expectation models structures on an industry-specific basis may further enhance the ability to predict future cash flow. In addition, further extension includes disaggregating cash flow into operations, investing, and financing components.

Appendix A: Variables definitions

This appendix shows the definitions of Worldscope items and DataStream Return Index (RI) used to construct the variables of this study along with the code of Worldscope items. World Scope company account system has been adapted by DataStream database since April 2003 onwards as a replacement of DataStream company account data.

Worldscope items

Worldscope item	Worldscope item code	Definition
Net cash flow – operating activities (applies to all industries)	WC 04860	<p>This item represents the net cash receipts and disbursements resulting from the operations of the company. It is the sum of Funds from Operations, Funds From/Used for Other Operating Activities and Extraordinary Items.</p> <p>Where: Funds from/for other operating activities (applies to all industries) (WC 04831) represent the net change in working capital apart from the increase/decrease in short-term borrowings and increase/decrease in cash & equivalents.</p>
Funds from operations (applies to all industries)	WC 04201	Funds from operations represent the sum of net income and all non-cash charges or credits.
Net income before extraordinary items/preferred dividends (applies to all industries)	WC 01551	This item represents income before extraordinary items and preferred and common dividends, but after operating and non-operating income and expense, reserves, income taxes, minority interest and equity in earnings.
Market capitalization (applies to all industries)	WC 08001	Market Price-Year End * Common Shares Outstanding

Return index

Item	Item code	Definition
Return index	RI	This item is available for individual equities and unit trusts. It shows a theoretical growth in value of a share holding over a specific period, assuming that dividends are reinvested to purchase additional units of an equity or unit trust at the closing price applicable on the ex-dividends date. For unit trusts, the closing bid price is used. Gross dividends are used where available and the calculation ignores tax and re-investment charges. Adjusted closing prices are used throughout to determine price index and hence return index.

Appendix B: (Robustness check): Using the annual raw returns as a dependent variable

Robustness check:

The first extension of the empirical work: using the annual raw returns as a dependent variable instead of annual market adjusted returns

The first robustness check of the empirical results presented in chapter 6 is to use the annual raw stock returns computed over May in year t to April in year $t+1$ ³¹² (four months lag period) as a dependent variable instead of the annual market adjusted returns. Several studies have checked their results by using the annual raw returns as a dependent variable (e.g., Ali, 1994; Ali & Pope, 1994 & 1995; Cheng & Yang, 2003).

The four models of testing the incremental information content of cash flow from operations and earnings and the effect of extreme earnings on the incremental information content of cash flow and earnings are re-estimated by using the annual raw returns as a dependent variable³¹³. The results are presented in tables B-1 to B-4³¹⁴. The analyses carried out in chapter 6, section 6.3, can be carried out for the interpretations of these results. The results are similar to those reported in chapter 6 when annual market adjusted returns was employed as a dependent variable³¹⁵.

The four models of testing the incremental information content of cash flow from operations and working capital from operations and the effect of extreme working capital from operations on the incremental information content of cash flow and working capital from operations are re-estimated by using the annual raw returns as a dependent variable³¹⁶. The results are presented in tables B-5 to B-8³¹⁷. The analyses carried out in chapter 6, section 6.4, can be carried out for the interpretations of these results. The results are similar to those reported in chapter 6 when annual market adjusted returns was employed as a dependent variable³¹⁸.

³¹² For computing the annual raw stock returns, see chapter 5, section 5.4.1

³¹³ See chapter 5, section 5.4.3 for a full discussion of these four models.

³¹⁴ For comments on these results, see chapter 7, section 7.2.1.

³¹⁵ See the empirical results reported based on using the annual market adjusted returns as a dependent variable in chapter 6, section 6.3.

³¹⁶ See chapter 5, section 5.4.3 for a full discussion of these four models.

³¹⁷ For comments on these results, see chapter 7, section 7.2.2.

³¹⁸ See the empirical results reported based on using the annual market adjusted returns as a dependent variable in chapter 6, section 6.4.

1 The incremental information content of cash flow from operations and earnings

Table B-1 The incremental information content of cash flow from operations and earnings: model 1(change model): change in cash flow from operations and earnings

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \varepsilon_{it}$$

Year	N	Coefficients (<i>t</i> -statistics)			Adj. <i>R</i> ²
		<i>α</i> 0	<i>α</i> 1	<i>α</i> 2	
Panel A: cross-sectional regressions					
1996	917	0.06	0.62	0.2	0.05
1997	1014	-0.001	0.52	0.25	0.04
1998	1050	-0.09	0.94	0.33	0.07
1999	983	0.1	0.52	0.16	0.04
2000	897	-0.04	0.48	0.23	0.04
2001	990	-0.3	0.66	0.39	0.05
2002	1000	-0.4	0.31	0.15	0.03
Mean		-0.1	0.58	0.25	0.05
<i>t</i> value		(-1.36)	(7.86)***	(7.32)***	
Panel B: pooled cross-sectional time-series regression					
pooled	6851	-0.1	0.51	0.21	0.04
<i>t</i> value		(-1.5)	(5.21)***	(2.67)***	

- Notes:
- N represents the number of firm-year observations for each year, and for the total number of observations respectively.
 - R_{it} is the annual raw stock return of firm i measured over the fifth month of year t to the fourth month of year $t+1$.
 - ΔE_{it} is the change in earnings and ΔCF_{it} is the change in cash flow from operations for firm i in year t . These variables are deflated by the market value of equity at the beginning of year t .
 - Mean represents the mean of the 7 yearly coefficients, and the t -statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
 - In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
 - ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table B-2 The incremental information content of cash flow from operations and earnings: model 2 (level and change combined model): level and change of cash flow from operations and earnings

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \varepsilon_{it}$$

Year	N	Coefficients (<i>t</i> -statistics)				<i>Sum of</i> (<i>a</i> 1+ <i>a</i> 3)	<i>Sum of</i> (<i>a</i> 2+ <i>a</i> 4)	<i>Adj. R</i> ²
		<i>a</i> 1	<i>a</i> 2	<i>a</i> 3	<i>a</i> 4			
1996	917	0.02	0.18	0.55	0.13	0.84	0.31	0.08
1997	1014	-0.09	-0.06	0.96	0.4	1.16	0.34	0.14
1998	1050	-0.16	0.06	0.7	0.45	1.08	0.51	0.13
1999	983	0.12	0.26	-0.01	-0.2	0.53	0.06	0.04
2000	897	-0.06	0.12	0.51	0.12	0.76	0.24	0.09
2001	990	-0.41	-0.57	0.73	1.63	0.99	1.06	0.27
2002	1000	-0.41	-0.04	0.44	0.7	0.61	0.66	0.15
Mean		-0.14	-0.01	0.56	0.46	0.85	0.46	0.13
<i>t</i> value		(-1.84)*	(-0.07)	(4.84)***	(2.07)**	(9.53)***	(3.66)***	

Panel A: cross-sectional regressions

Panel B: pooled cross-sectional time-series regression

Pooled	6851	-0.16	0.22	0.62	0.55	0.84	0.49	0.13
<i>t</i> value		(-2.13)**	(2.67)***	(7.3)***	(2.22)**	(12.32)***	(3.06)***	

Notes:

- N represents the number of firm-year observations for each year and for the total number of observations respectively.
- *R_{it}* is the annual raw stock return of firm *i* measured over the fifth month of year *t* to the fourth month of year *t*+1.
- ΔE_{it} (*E_{it}*) is the change (level) in earnings and ΔCF_{it} (*CF_{it}*) is the change (level) in cash flow from operations for firm *i* in year *t*. These variables are deflated by the market value of equity at the beginning of year *t*
- Mean represents the mean of the 7 yearly coefficients, and *t*-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
- Sum of (*a*₁+*a*₃) is the sum of the estimated coefficients of the change and level of earning.
- Sum of (*a*₂+*a*₄) is the sum of the estimated coefficients of the change and level of the cash flow from operations.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table B-3 The effect of the extremity of earnings on the incremental information content of cash flow from operations and earnings whilst controlling for the extremity of cash flow: contextual model with a dummy variable approach regression results for the sub-sample of moderate cash flow (model 3)

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \epsilon_{it}$$

Coefficients (*t*-statistics)

Year	N	α_0	α_1	α_2	α_3	α_4	α_5	α_6	α_7	α_8	Sum of ($\alpha_1 + \alpha_3$)	Sum of ($\alpha_2 + \alpha_4$)	Sum of ($\alpha_5 + \alpha_7$)	Sum of ($\alpha_6 + \alpha_8$)	Adj. R^2
Panel A: cross-sectional regressions															
1996	559	-0.24	0.64	-0.25	4.71	-0.18	-0.7	0.31	-4.34	2.57	5.35	-0.43	-5.04	2.88	0.21
1997	587	-0.28	0.82	-0.13	2.6	1.5	-0.04	-0.14	-2.37	1.07	3.42	1.37	-2.41	0.93	0.23
1998	569	-0.37	0.72	-0.22	3.61	1.03	-0.51	0.45	-3.27	1.36	4.33	0.81	-3.78	1.81	0.23
1999	543	-0.11	0.73	0.29	3.64	-0.53	-0.21	-0.5	-3.71	2.38	4.37	-0.24	-3.92	1.88	0.16
2000	466	-0.28	0.58	0.06	4.82	0.07	-0.19	-0.39	-4.46	1.69	5.4	0.13	-4.65	1.3	0.23
2001	469	-0.6	-0.01	-0.51	5.96	1.65	0.18	0.2	-5.6	2.52	5.95	1.14	-5.42	2.72	0.37
2002	476	-0.56	-0.29	0.32	5.27	0.39	0.41	-0.53	-4.69	2.1	4.98	0.71	-4.28	1.57	0.34
Mean		-0.35	0.46	-0.06	4.37	0.56	-0.15	-0.09	-4.06	1.96	4.83	0.5	-4.22	1.87	0.25
<i>t</i> value		(-5.23)***	(2.82)**	(-0.6)	(10.08)***	(1.76)*	(-1.05)	(-0.56)	(-10.24)***	(8.73)***	(15.05)***	(1.91)*	(-11.28)***	(6.95)***	
Panel B: pooled cross-sectional time-series regression															
Pooled	3669	-0.35	0.25	0.05	5.11	0.07	-0.15	-0.19	-4.51	2.27	5.36	0.12	-4.66	2.08	0.25
<i>t</i> value		(-5.47)***	(1.5)	(0.35)	(8.7)***	(0.17)	(-1.14)	(-1.3)	(-8.56)***	(9.95)***	(12.6)***	(0.46)	(-11.57)***	(8.88)***	

Notes

- N represents the number of firm-year observations for each year, and for the total number of observations respectively.
- R_{it} is the annual raw stock return of firm *i* measured over the fifth month of year *t* to the fourth month of year *t* + 1.
- ΔE_{it} (E_{it}) is the change (level) in earnings and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm *i* in year *t*. These variables are deflated by the market value of equity at the beginning of year *t*.
- Mean represents the mean of the 7 yearly coefficients, and the *t*-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
- Sum of ($\alpha_1 + \alpha_7$) is the sum of the estimated coefficients of the change and level of earnings in the existence of its extremity.
- Sum of ($\alpha_6 + \alpha_8$) is the sum of the estimated coefficients of the change and level of earnings in the existence of its extremity.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- The whole sample of each year has been divided into two sub-samples: a moderate cash flow sub-sample and an extreme cash flow sub-sample. The sample in model 3 is the sub-sample of moderate cash flow from operations observations. The ratio of cash flow from operations to market value of equity at the end of year *t* used to determine moderate cash flow from operations. Moderate cash flow from operations is defined by dividing all firms in each year into nine groups depending upon the magnitude of the ratio of cash flow from operations to market value of equity at the end of year *t* with an approximately equal number of firms per group where the tenth group is assigned to firms with negative ratio of cash flow from operations to market value of equity at the end of year *t*. The middle six groups are considered as moderate cash flow from operations. Moderate cash flow from operations observations, in this sub-sample, are classified into two groups: moderate earnings and extreme earnings. The ratio of earnings to market value of equity at the end of year *t* used to determine the two groups; all firms in each year are divided into nine groups depending upon the magnitude of the ratio of earnings to market value of equity at the end of year *t* with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratio of earnings to market value of equity at the end of year *t*. The middle six groups are classified as moderate and the other four groups are classified as extreme. D_{it} = 0 for moderate firms and D_{it} = 1 for extreme firms.
- *** **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table B-4 the effect of the extremity of earnings on the incremental information content of cash flow from operations and earnings whilst controlling for the extremity of cash flow: contextual model with a dummy variable approach regression results for the sub-sample of extreme cash flow (model 4)

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \varepsilon_{it}$$

Coefficients (*t*-statistics)

Year	N	α_0	α_1	α_2	α_3	α_4	α_5	α_6	α_7	α_8	Sum of ($\alpha_1 + \alpha_3$)	Sum of ($\alpha_2 + \alpha_4$)	Sum of ($\alpha_5 + \alpha_7$)	Sum of ($\alpha_6 + \alpha_8$)	Adj. R^2
Panel A: cross-sectional regressions															
1996	358	-0.06	0.23	0.28	2.61	-0.39	0.18	0.1	-2.41	0.4	2.84	-0.11	-2.23	0.5	0.12
1997	427	-0.16	0.45	0.38	2.1	0.12	-0.47	-0.57	-1.15	-0.06	2.55	0.5	-1.62	-0.63	0.2
1998	481	-0.25	0.68	0.1	2.16	-0.24	-0.32	-0.22	-1.8	0.77	2.84	-0.14	-2.12	0.55	0.12
1999	440	0.12	0.25	0.52	0.64	-0.72	0.14	0.06	-0.66	0.31	0.89	-0.2	-0.52	0.37	0.04
2000	431	-0.15	0.32	-0.21	1.9	0.04	-0.317	0.72	-1.43	-0.27	2.22	-0.17	-1.747	0.45	0.09
2001	521	-0.6	0.41	-0.36	4.99	0.68	-0.03	-0.26	-4.83	0.9	5.4	0.32	-4.86	0.64	0.27
2002	524	-0.63	-0.22	0.02	5.03	0.33	0.41	0.14	-4.85	0.01	4.81	0.35	-4.44	0.15	0.13
Mean		-0.25	0.3	0.11	2.78	-0.03	-0.06	-0.01	-2.45	0.3	3.08	0.08	-2.51	0.29	0.14
<i>t</i> value		(-2.37)**	(2.90)**	(0.87)	(4.47)***	(-0.15)	(-0.48)	(-0.03)	(-3.76)***	(1.8)*	(5.28)***	(0.7)	(-4.22)***	(1.77)*	
Panel B: pooled cross-sectional time-series regression															
Pooled	3182	-0.29	0.15	0.12	3.26	-0.03	0.07	-0.16	-2.92	0.45	3.41	0.09	-2.85	0.29	0.14
<i>t</i> value		(-2.84)***	(1.05)	(0.93)	(4.39)***	(-0.16)	(0.66)	(-1.29)	(-3.9)***	(2.56)**	(5.11)***	(1.02)	(-4.3)***	(1.91)*	

Notes

- N represents the number of firm-year observations for each year, and for the total number of observation *s* respectively.
- R_{it} is the annual raw stock return of firm *i* measured over the fifth month of year *t* to the fourth month of year *t*+1.
- ΔE_{it} (E_{it}) is the change (level) in earnings and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm *i* in year *t*. These variables are deflated by the market value of equity at the beginning of year *t*.
- Mean represents the mean of the 7 yearly coefficients, and the *t*-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
- Sum of ($\alpha_5 + \alpha_7$) is the sum of the estimated coefficients of the change and level of earnings in the existence of its extremity.
- Sum of ($\alpha_6 + \alpha_8$) is the sum of the estimated coefficients of the change and level of extreme cash flow from operations conditioned on the extremity of earnings.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- The whole sample of each year has been divided into two sub-samples: a moderate cash flow sub-sample and an extreme cash flow sub-sample. The sample in model 4 is the sub-sample of extreme cash flow from operations observations. The ratio of cash flow from operations to market value of equity at the end of year *t* used to determine extreme cash flow from operations. Extreme cash flow from operations is defined by dividing all firms in each year into nine groups depending upon the magnitude of the ratio of cash flow from operations to market value of equity at the end of year *t* with an approximately equal number of firms per group where the tenth group is assigned to firms with negative ratio of cash flow from operations to market value of equity at the end of year *t*. The first, second, ninth and tenth groups are considered as extreme cash flow from operations. Extreme cash flow from operations observations, in this sub-sample, are classified into two groups: moderate earnings and extreme earnings. The ratio of earnings to market value of equity at the end of year *t* used to determine the two groups; all firms in each year are divided into nine groups depending upon the magnitude of the ratio of earnings to market value of equity at the end of year *t* with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratio of earnings to market value of equity at the end of year *t*. The middle six groups are classified as moderate and the other four groups are classified as extreme. D_{it} = 0 for moderate firms and D_{it} = 1 for extreme firms.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

2 The incremental information content of cash flow from operations and working capital from operations

Table B-5 The Incremental information content of cash flow from operations and working capital from operations: model 1(change model): change in cash flow from operations and working capital from operations

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \varepsilon_{it}$$

Year	<i>N</i>	Coefficients (<i>t</i> -statistics)		<i>α</i> 2	<i>Adj.R</i> ²
		<i>α</i> 0	<i>α</i> 1		
Panel A: cross-sectional regressions					
1996	921	0.06	1.32	0.07	0.09
1997	1015	-0.02	1.44	-0.07	0.09
1998	1053	-0.1	1.77	0.07	0.1
1999	984	0.1	1.24	-0.19	0.05
2000	900	-0.05	1.12	-0.12	0.04
2001	992	-0.31	0.71	0.33	0.03
2002	1004	-0.41	0.81	-0.18	0.02
Mean		-0.11	1.2	-0.01	0.06
<i>t</i> value		(-1.46)*	(8.72)***	(-0.19)	
Panel B: pooled cross-sectional time-series regression					
pooled	6869	-0.11	1.1	-0.06	0.04
<i>t</i> value		(-1.6)	(8.65)***	(-0.45)	

- Notes:
- N represents the number of firm-year observations for each year, and for the total number of observations respectively.
 - *R_{it}* is the annual raw stock return of firm *i* measured over the fifth month of year *t* to the fourth month of year *t*+1.
 - ΔE_{it} is the change in working capital from operations and ΔCF_{it} is the change in cash flow from operations for firm *i* in year *t*. These variables are deflated by the market value of equity at the beginning of year *t*.
 - Mean represents the mean of the 7 yearly coefficients, and the *t*-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
 - In pooled cross- sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
 - ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table B-6 The incremental information content of cash flow from operations and working capital from operations: model 2 (level and change combined model): level and change of cash flow from operations and working capital from operations

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \varepsilon_{it}$$

Coefficients (*t*-statistics)

Year	N	α_0	α_1	α_2	α_3	α_4	Sum of ($\alpha_1 + \alpha_3$)	Sum of ($\alpha_2 + \alpha_4$)	Adj. R^2
Panel A: cross-sectional regressions									
1996	921	0.01	0.92	0.14	0.64	-0.2	1.56	-0.06	0.1
1997	1015	-0.11	0.94	-0.12	0.77	0.15	1.71	0.03	0.16
1998	1053	-0.19	1.17	-0.05	0.75	0.16	1.92	0.11	0.14
1999	984	0.12	1.47	-0.28	-0.42	0.19	1.05	-0.09	0.06
2000	900	-0.1	0.66	-0.04	0.75	-0.18	1.41	-0.22	0.07
2001	992	-0.49	-0.15	-0.13	1.81	0.61	1.66	0.48	0.27
2002	1004	-0.49	0.44	-0.16	1.1	0.24	1.54	0.08	0.17
Mean		-0.18	0.78	-0.09	0.77	0.14	1.55	0.05	0.14
<i>t</i> value		(-2.01)**	(3.91)***	(-1.87)*	(3.07)**	(1.34)	(15.07)***	(0.56)	
Panel B: Pooled cross-sectional time-series regression									
Pooled	6869	-0.21	0.56	-0.14	1.01	0.18	1.57	0.04	0.13
<i>t</i> value		(-2.44)**	(2.61)***	(-1.69)*	(3.22)***	(1.4)	(12.48)***	(0.3)	

Notes:

- N represents the number of firm-year observations for each year and for the total number of observations respectively.
- R_{it} is the annual raw stock return of firm *i* measured over the fifth month of year *t* to the fourth month of year *t*+1.
- ΔE_{it} (E_{it}) is the change (level) in working capital from operations and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm *i* in year *t*. These variables are deflated by the market value of equity at the beginning of year *t*
- Mean represents the mean of the 7 yearly coefficients, and the *t*-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
- Sum of ($\alpha_1 + \alpha_3$) is the sum of the estimated coefficients of the change and level of working capital from operations.
- Sum of ($\alpha_2 + \alpha_4$) is the sum of the estimated coefficients of the change and level of cash flow from operations.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table B-7 The effect of the extremity of working capital from operations on the incremental information content of cash flow from operations and working capital from operations whilst controlling for the extremity of cash flow: contextual model with a dummy variable approach regression results for the sub-sample of moderate cash flow (model 3)

$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \varepsilon_{it}$															
Coefficients (<i>t</i> -statistics)															
Year	N	α_0	α_1	α_2	α_3	α_4	α_5	α_6	α_7	α_8	Sum of ($\alpha_1 + \alpha_3$)	Sum of ($\alpha_2 + \alpha_4$)	Sum of ($\alpha_5 + \alpha_7$)	Sum of ($\alpha_6 + \alpha_8$)	Adj. R^2
Panel A: cross-sectional regressions															
1996	558	-0.2	1.3	-0.34	2.29	0.14	-0.44	0.3	-2.11	1.91	3.59	-0.2	-2.55	2.21	0.23
1997	589	-0.23	1.48	-0.69	0.98	1.7	0.48	0.52	-0.89	0.2	2.46	1.01	-0.41	0.72	0.24
1998	569	-0.34	0.95	-0.7	2.13	1.15	0.51	0.25	-3.2	2.32	3.08	0.45	-2.69	2.57	0.23
1999	547	-0.1	2.13	-1.02	0.71	1.4	-1.49	0.7	-0.94	0.39	2.84	0.38	-2.43	1.09	0.13
2000	469	-0.3	0.05	0.24	3.72	-0.63	0.97	-0.16	-3.08	1.93	3.77	-0.39	-2.11	1.77	0.2
2001	468	-0.6	-0.22	-0.09	3.65	1.37	0.28	-0.49	-3.4	2.42	3.43	1.28	-3.12	1.93	0.33
2002	480	-0.63	0.12	0.21	3.82	0.09	-0.07	-0.15	-3.02	1.83	3.94	0.3	-3.09	1.68	0.3
Mean		-0.34	0.83	-0.34	2.47	0.75	0.04	0.14	-2.38	1.57	3.3	0.41	-2.34	1.71	0.24
<i>t</i> value		(-4.51)***	(2.52)**	(-1.86)*	(5.01)***	(2.26)**	(0.11)	(0.87)	(-5.83)***	(4.62)***	(16.42)***	(1.79)*	(-6.71)***	(7.14)***	
Panel B: pooled cross-sectional time-series regression															
Pooled	3680	-0.34	0.7	-0.29	2.91	0.34	-0.32	0.21	-2.23	1.39	3.61	0.05	-2.55	1.6	0.21
<i>t</i> value		(-4.97)***	(2.05)**	(-1.46)	(4.98)***	(0.82)	(-1.06)	(1.08)	(-4.75)***	(3.57)***	(13.89)***	(0.21)	(-9.2)***	(6.38)***	

Notes

- N represents the number of firm-year observations for each year, and for the total number of observations respectively.
- R_{it} is the annual raw stock return of firm i measured over the fifth month of year t to the fourth month of year t+1.
- ΔE_{it} (E_{it}) is the change (level) in working capital from operations and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm i in year t. These variables are deflated by the market value of equity at the beginning of year t.
- Mean represents the mean of the 7 yearly coefficients, and the t-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
- Sum of (a₅+a₇) is the sum of the estimated coefficients of the change and level of working capital from operations in the existence of its extremity.
- Sum of (a₆+a₈) is the sum of the estimated coefficients of the change and level of moderate cash flow from operations conditioned on the extremity of working capital from operations.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- The whole sample of each year has been divided into two sub-samples: a moderate cash flow sub-sample and an extreme cash flow sub-sample. The sample in model 3 is the sub-sample of moderate cash flow from operations observations. The ratio of cash flow from operations to market value of equity at the end of year t used to determine moderate cash flow from operations. Moderate cash flow from operations is defined by dividing all firms in each year into nine groups depending upon the magnitude of the ratio of cash flow from operations to market value of equity at the end of year t with an approximately equal number of firms per group. Moderate cash flow from operations is assigned to firms with negative ratio of cash flow from operations and extreme working capital from operations. The ratio of working capital from operations to market value of equity at the end of year t used to determine the two groups; all firms in each year are divided into nine groups depending upon the magnitude of the ratio of working capital from operations to market value of equity at the end of year t with an approximately equal number of firms per group, where the tenth group is assigned to firms with negative ratio of working capital from operations to market value of equity at the end of year t. The middle six groups are classified as moderate and the other four groups are classified as extreme. D_{it} = 0 for moderate firms and D_{it} = 1 for extreme firms.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table B-8 The effect of the extremity of working capital from operations on the incremental information content of cash flow from operations and working capital from operations whilst controlling for the extremity of cash flow: contextual model with a dummy variable approach regression results for the sub-sample of extreme cash flow (model 4)

$$R_{it} = \alpha_{0i} + \alpha_{1i} \Delta E_{it} + \alpha_{2i} \Delta CF_{it} + \alpha_{3i} E_{it} + \alpha_{4i} CF_{it} + \alpha_{5i} D_{it} \times \Delta E_{it} + \alpha_{6i} D_{it} \times \Delta CF_{it} + \alpha_{7i} D_{it} \times E_{it} + \alpha_{8i} D_{it} \times CF_{it} + \varepsilon_{it}$$

Coefficients (*t*-statistics)

Year	N	α_0	α_1	α_2	α_3	α_4	α_5	α_6	α_7	α_8	Sum of ($\alpha_1 + \alpha_3$)	Sum of ($\alpha_2 + \alpha_4$)	Sum of ($\alpha_5 + \alpha_7$)	Sum of ($\alpha_6 + \alpha_8$)	Adj. R ²
Panel A: Cross-sectional regressions															
1996	363	-0.05	1.12	0.34	1.46	-0.63	-0.83	0.04	-1.02	0.32	2.58	-0.29	-1.85	0.36	0.11
1997	426	-0.19	0.83	-0.03	1.05	0.15	-0.28	-0.11	0.11	-0.59	1.88	0.12	-0.17	-0.7	0.18
1998	484	-0.28	0.72	0.08	1.58	-0.27	0.44	-0.21	-1.49	0.73	2.3	-0.19	-1.05	0.52	0.13
1999	437	0.12	1.67	-0.21	-0.44	0.12	-0.44	0.22	0.19	-0.4	1.23	-0.09	-0.25	-0.18	0.06
2000	431	-0.19	0.59	-0.06	1.4	-0.23	-0.18	0.19	-1.23	0.22	1.99	-0.29	-1.41	0.41	0.05
2001	524	-0.67	-0.41	0.12	3.7	0.03	0.41	-0.25	-2.97	0.85	3.29	0.15	-2.56	0.6	0.3
2002	524	-0.68	-0.02	0.31	3.05	-0.42	0.6	-0.59	-2.54	0.59	3.03	-0.11	-1.94	0	0.16
Mean		-0.28	0.64	0.08	1.69	-0.18	-0.04	-0.1	-1.28	0.25	2.33	-0.1	-1.32	0.15	0.14
<i>t</i> value		(-2.44)**	(2.46)**	(1.05)	(3.3)***	(-1.62)*	(-0.2)	(-0.95)	(-2.82)**	(1.18)	(8.71)***	(-1.48)*	(-3.92)***	(0.83)	
Panel B: pooled cross-sectional time-series regression															
Pooled	3189	-0.34	0.35	0.14	2.15	-0.22	0.2	-0.4	-1.7	0.52	2.5	-0.08	-1.5	0.12	0.13
<i>t</i> value		(-2.95)***	(1.13)	(1.09)	(3.64)***	(-2.07)**	(0.97)	(-4.67)***	(-3.76)***	(2.72)**	(8.29)***	(-0.98)	(-5.09)***	(0.61)	

Notes

- N represents the number of firm-year observations for each year, and for the total number of observations respectively.
- R_{it} is the annual raw stock return of firm *i* measured over the fifth month of year *t* to the fourth month of year *t*+1.
- ΔE_{it} (E_{it}) is the change (level) in working capital from operations and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm *i* in year *t*. These variables are deflated by the market value of equity at the beginning of year *t*.
- Mean represents the mean of the 7 yearly coefficients, and the *t*-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
- Sum of ($\alpha_5 + \alpha_7$) is the sum of the estimated coefficients of the change and level of working capital from operations in the existence of its extremity.
- Sum of ($\alpha_6 + \alpha_8$) is the sum of the estimated coefficients of the change and level of extreme cash flow from operations conditioned on the extremity of working capital from operations.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- The whole sample of each year has been divided into two sub-samples: a moderate cash flow sub-sample and an extreme cash flow sub-sample. The sample in model 4 is the sub-sample of extreme cash flow from operations observations. The ratio of cash flow from operations to market value of equity at the end of year *t* used to determine extreme cash flow from operations. Extreme cash flow from operations is defined by dividing all firms in each year into nine groups depending upon the magnitude of the ratio of cash flow from operations to market value of equity at the end of year *t*. The first, second, ninth and tenth groups are considered as extreme cash flow from operations. Extreme cash flow from operations observations, in this sub-sample, are classified into two groups: moderate working capital from operations and extreme working capital from operations. The ratio of working capital from operations to market value of equity at the end of year *t* used to determine the two groups; all firms in each year are divided into nine groups depending upon the magnitude of the ratio of working capital from operations to market value of equity at the end of year *t*. The middle six groups are classified as moderate and the other four groups are classified as extreme. D_{it} = 0 for moderate firms and D_{it} = 1 for extreme firms.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Appendix C: (Robustness check): Using an alternative method for measuring the extremity

Robustness check

The second extension of the empirical work: using alternative method for measuring the extremity

As a second extension to the empirical work of this study, this appendix reports on the robustness of using an alternative method for measuring the extremity of earnings, working capital from operations, and cash flow from operations. Based on the same two contextual models with a dummy variable approach, (models 3 and 4), used for measuring the effect of the extremity presented in chapter 5³¹⁹, the study re-examines the following issues by using an alternative method for measuring the extremity (the absolute value of changes in the respective measure scaled by beginning price)³²⁰.

- The effect of the extremity of earnings on the incremental information content of cash flow from operations and earnings.
- The effect of the extremity of working capital from operations on the incremental information content of cash flow from operations and working capital from operations.

A. In the case of testing the effect of earnings extremity on the incremental information content of cash flow and earnings.

Following Cheng & Yang (2003), the absolute value of changes in earnings deflated by the market value of equity at the beginning of year t is used to measure the extremity of earnings and the absolute value of changes in cash flow from operations deflated by the market value of equity at the beginning of year t is used to control for the extremity of cash flow from operations. The following procedures are followed to measure the extremity of earnings and to control for the extremity of cash flow from operations where the whole sample of the study in each year is divided into two sub-samples (moderate cash flow and extreme cash flow) as follows.

- The first sub-sample represents moderate cash flow from operations (Model 3). Moderate cash flow is defined as the observations which the

³¹⁹ For further details of the two contextual models with a dummy variable approach (models 3 and model 4) of measuring (i) the effect of the extremity of earnings on the incremental information content of cash flow from operations, and (ii) the effect of the extremity of working capital from operations on the incremental information content of cash flow from operations, see chapter 5, section 5.4.3.2.

³²⁰ See chapter 5, section 5.4.3.2 for further details of the other method of measuring the extremity of earnings, working capital from operations, and cash flow from operations cash flow (the respective measure to price ratios).

absolute value of their cash flow from operations changes lie below the yearly median. Moderate cash flow from operations observations, in this sub-sample, are classified into two groups: moderate earnings, and extreme earnings based on whether the absolute value of their earnings changes lie above or below the yearly median. Firms falling below the median are classified as moderate, and firms falling above the median as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms. The regression analysis is then conducted for model 3.

- The second sub-sample represents extreme cash flow from operations (model 4). Extreme cash flow is defined as the observations which the absolute value of their cash flow from operations changes lie above the yearly median. Extreme cash flow from operations observations, in this sub-sample, are classified into two groups: moderate earnings, and extreme earnings based on whether the absolute value of their earnings changes lie above or below the yearly median. Firms falling below the median are classified as moderate and firms falling above the median as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms. The regression analysis is then conducted for model 4.

Model 3 has been re-estimated to examine the effect of extreme earnings on the incremental information content of cash flow from operations and earnings for moderate cash flow sub-sample. Model 4 has been re-estimated to examine the effect of extreme earnings on the incremental information content of cash flow from operations and earnings for extreme cash flow sub-sample³²¹. The results are presented in tables C-1 and C-2³²². The analyses carried out in chapter 6, section 6.3.3, can be carried out for the interpretations of these results.

The results are similar to those reported in chapter 6 when cash flow (earnings) extremity is measured by cash flow (earnings) to price ratios³²³. However, in model 3, this method of extremity indicates weak evidence of extreme earnings leading to incremental information content for moderate cash flow from operations. The summed coefficients of the level and change of moderate cash

³²¹ See chapter 5, section 5.4.3 for a full discussion of these two models.

³²² For comments on these results, see chapter 7, section 7.2.1.

³²³ See the empirical results reported based on using cash flow (earnings) to price ratios for measuring the extremity of cash flow (earnings) in chapter 6, section 6.3.3.

flow when earnings are extreme was positive and not significant based on cross-temporal t -statistics and positive and significant at the 5% level based on pooled regression (see table C-1). The summed coefficients of the level and change of moderate cash flow when earnings are extreme was positive and significant at the 1 % level by using either the mean of the yearly coefficients derived from yearly cross-sectional regressions or the pooled regression when cash flow (earnings) extremity is measured by cash flow (earnings) to price ratios. These results reveal that measuring cash flow (earnings) extremity by cash flow (earnings) to price ratios is superior to measuring cash flow (earnings) extremity by the absolute value of changes in cash flow (earnings) scaled by beginning price for detecting incremental information content for moderate cash when earnings are extreme³²⁴.

B. In the case of testing the effect of working capital from operations extremity on the incremental information content of cash flow and working capital from operations.

Following a similar methodology used in measuring the extremity of earnings and cash flow from operations, the absolute value of changes in working capital from operations deflated by the market value of equity at the beginning of year t is used to measure the extremity of working capital from operations and the absolute value of changes in cash flow from operations deflated by the market value of equity at the beginning of year t is used to control for the extremity of cash flow from operations. The following procedures are followed to measure the extremity of working capital from operations and to control for the extremity of cash flow from operations where the whole sample of the study in each year is divided into two sub-samples (moderate cash flow and extreme cash flow) as follows.

- The first sub-sample represents moderate cash flow from operations (Model 3). Moderate cash flow is defined as the observations which the absolute value of their cash flow from operations changes lie below the

³²⁴ See the empirical results reported based on using cash flow (earnings) to price ratios for measuring the extremity of cash flow (earnings) in chapter 6, section 6.3.3.

yearly median. Moderate cash flow from operations observations, in this sub-sample, are classified into two groups: moderate working capital from operations, and extreme working capital from operations based on whether the absolute value of their working capital from operations changes lie above or below the yearly median. Firms falling below the median are classified as moderate and firms failing above the median as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms. The regression analysis is then conducted for Model 3.

- The second sub-sample represents extreme cash flow from operations (Model 4). Extreme cash flow is defined as the observations which the absolute value of their cash flow from operations changes lie above the yearly median. Extreme cash flow from operations observations, in this sub-sample, are classified into two groups: moderate working capital from operations, and extreme working capital from operations based on whether the absolute value of their working capital from operations changes lie above or below the yearly median. Firms falling below the median are classified as moderate and firms failing above the median as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms. The regression analysis is then conducted for Model 4.

Model 3 has been re-estimated to examine the effect of extreme working capital from operations on the incremental information content of cash flow from operations and working capital from operations for the moderate cash flow sub-sample. Model 4 has been re-estimated to examine the effect of extreme working capital from operations on the incremental information content of cash flow from operations and working capital from operations for an extreme cash flow sub-sample³²⁵. The results are presented in table C-3 and C-4³²⁶. The analyses carried out in chapter 6, section 6.4.3, can be carried out for the interpretations of these results. The results are similar to those reported in chapter 6 when cash flow

³²⁵ See chapter 5, section 5.4.3 for a full discussion of these two models.

³²⁶ For comments on these results, see chapter 7, section 7.2.2.

(working capital from operations) extremity is measured by cash flow (working capital from operations) to price ratios³²⁷.

³²⁷ See the empirical results reported based on using cash flow (working capital from operations) to price ratios for measuring the extremity of cash flow (working capital from operations) in chapter 6, section 6.4.3.

Table C-1 The effect of the extremity of earnings on the incremental information content of cash flow from operations and earnings whilst controlling for the extremity of cash flow: contextual model with a dummy variable approach regression results for the sub-sample of moderate cash flow (model 3)

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \varepsilon_{it}$$

Coefficients (*t*-statistics)

Year	N	<i>a</i> 1	<i>a</i> 2	<i>a</i> 3	<i>a</i> 4	<i>a</i> 5	<i>a</i> 6	<i>a</i> 7	<i>a</i> 8	Sum of (<i>a</i> 1+ <i>a</i> 3)	Sum of (<i>a</i> 2+ <i>a</i> 4)	Sum of (<i>a</i> 5+ <i>a</i> 7)	Sum of (<i>a</i> 6+ <i>a</i> 8)	Adj. <i>R</i> ²
Panel A: cross-sectional regressions														
1996	459	-0.15	7.02	1.35	0.27	-0.07	-6.95	-1.56	0.9	7.29	1.28	-6.05	-1.4	0.1
1997	507	-0.41	8.42	-0.41	0.8	0.97	-7.62	1.29	-0.38	9.22	0.56	-8	1.47	0.14
1998	525	-0.35	11.7	-0.84	-1.59	2.53	-11.57	2.33	2.87	10.11	1.69	-8.7	0.44	0.17
1999	491	0.04	9.26	3.46	0.27	-0.99	-8.55	-0.91	0.84	9.53	2.47	-8.86	-0.07	0.06
2000	448	-0.12	15.25	-1.26	2.06	-1.14	-14.56	1.49	1.55	17.31	-2.4	-15.79	3.04	0.09
2001	495	-0.43	9.49	0.84	1.87	2.83	-8.87	0.94	-0.68	11.36	3.67	-10.41	0.26	0.27
2002	500	-0.27	3.61	1.2	2.19	0.87	-3.33	0.7	0.14	5.8	2.07	-5.35	0.84	0.14
Mean		-0.24	9.25	0.62	0.84	0.72	-8.78	0.61	0.04	10.09	1.34	-9.02	0.66	0.14
<i>t</i> value		(-3.7)***	(6.72)***	(1.01)	(1.64)*	(1.2)	(-6.54)***	(1.18)	(0.1)	(7.26)***	(1.85)*	(-6.93)***	(1.26)	
Panel B: pooled cross-sectional time-series regression														
Pooled	3425	-0.26	7.94	0.73	0.88	0.84	-7.33	0.88	-0.6	8.82	1.57	-7.93	1.03	0.12
<i>t</i> value		(-4.2)***	(3.92)***	(1.24)	(1.3)	(1.42)	(-3.81)***	(1.66)*	(-0.83)	(4.94)***	(2.58)***	(-4.83)***	(2.2)**	

Notes:

- N represents the number of firm-year observations for each year, and for the total number of observations respectively.
- R_{it} is the annual market adjusted stock return of firm *i* measured over the fifth month of year *t* to the fourth month of year *t*+1.
- ΔE_{it} (E_{it}) is the change (level) in earnings and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm *i* in year *t*. These variables are deflated by the market value of equity at the beginning of year *t*.
- Mean represents the mean of the 7 yearly coefficients, and the *t*-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
- Sum of (a_5 + a_7) is the sum of the estimated coefficients of the change and level of earnings in the existence of its extremity
- Sum of (a_6 + a_8) is the sum of the estimated coefficients of the change and level of moderate cash flow from operations conditioned on the extremity of earnings.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- The whole sample of each year has been divided into two sub-samples: a moderate cash flow sub-sample and an extreme cash flow sub-sample. The sample in model 3 is the sub-sample of moderate cash flow from operations observations. Moderate cash flow is defined as the observations which the absolute value of their cash flow from operations changes lie below the yearly median. Moderate cash flow from operations observations, in this sub-sample, are classified into two groups moderate earnings and extreme earnings based on whether the absolute value of their earnings changes lies above or below the yearly median. Firms falling below the median are classified as moderate and firms falling above the median as extreme. D_{it} = 0 for moderate firms and D_{it} = 1 for extreme firms.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table C-2 The effect of the extremity of earnings on the incremental information content of cash flow from operations and earnings whilst controlling for the extremity of cash flow: contextual model with a dummy variable approach regression results for the sub-sample of extreme cash flow (model 4)

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \varepsilon_{it}$$

Coefficients (t-statistics)

Year	N	α_0	α_1	α_2	α_3	α_4	α_5	α_6	α_7	α_8	Sum of ($\alpha_1 + \alpha_3$)	Sum of ($\alpha_2 + \alpha_4$)	Sum of ($\alpha_5 + \alpha_7$)	Sum of ($\alpha_6 + \alpha_8$)	Adj. R ²
Panel A: cross-sectional regressions															
1996	458	-0.14	6.54	0.01	0.21	0.19	-6.31	0.26	0.24	-0.13	6.75	0.2	-6.07	0.13	0.11
1997	507	-0.33	5.3	0.07	0.76	0.16	-5.23	-0.06	0.29	-0.01	6.06	0.23	-4.94	-0.07	0.2
1998	525	-0.31	5.33	0.17	1.42	-0.08	-4.91	0.04	-0.99	0.41	6.75	0.09	-5.9	0.45	0.18
1999	492	0.03	6.3	-0.34	-0.9	0.13	-5.87	0.66	0.91	-0.21	5.4	-0.21	-4.96	0.45	0.08
2000	449	-0.08	3.46	-0.14	0.74	0.22	-3.33	0.5	-0.3	-0.26	4.2	0.08	-3.63	0.24	0.16
2001	495	-0.18	3.82	-0.09	1.78	0.99	-3.62	-0.39	-1.1	0.24	5.6	0.9	-4.72	-0.15	0.35
2002	500	-0.14	1.63	-0.12	1.25	0.81	-1.46	0.07	-0.84	-0.43	2.88	0.69	-2.3	-0.36	0.24
Mean		-0.17	4.63	-0.06	0.75	0.35	-4.39	0.16	-0.26	-0.06	5.38	0.28	-4.65	0.1	0.19
t value		(-3.46)***	(6.99)***	(-1.01)	(2.23)**	(2.32)**	(-6.87)***	(1.16)	(-0.89)	(-0.5)	(10.1)***	(1.96)**	(-9.37)***	(0.85)	
Panel B: pooled cross-sectional time-series regression															
Pooled	3426	-0.19	3.47	-0.09	0.92	0.44	-3.23	0.07	-0.6	-0.03	4.39	0.35	-3.83	0.04	0.16
t value		(-4.34)***	(4.64)***	(-1.93)*	(4.84)***	(2.26)**	(-4.48)***	(0.91)	(-3.61)***	(-0.29)	(6.78)***	(2.01)**	(-5.92)***	(0.36)	

Notes:

- N represents the number of firm-year observations for each year, and for the total number of observations respectively.
- R_{it} is the annual market adjusted stock return of firm i measured over the fifth month of year t to the fourth month of year $t+1$.
- ΔE_{it} (E_{it}) is the change (level) in earnings and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm i in year t . These variables are deflated by the market value of equity at the beginning of year t .
- Mean represents the mean of the 7 yearly coefficients, and the t-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
- Sum of ($\alpha_5 + \alpha_7$) is the sum of the estimated coefficients of the change and level of earnings in the existence of its extremity.
- Sum of ($\alpha_6 + \alpha_8$) is the sum of the estimated coefficients of the change and level of extreme cash flow from operations conditioned on the extremity of earnings.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- The whole sample of each year has been divided into two sub-samples: a moderate cash flow sub-sample and an extreme cash flow sub-sample. The sample in model 4 is the sub-sample of extreme cash flow from operations observations. Extreme cash flow is defined as the observations which the absolute value of their cash flow from operations changes lie above the yearly median. Extreme cash flow from operations observations, in this sub-sample, are classified into two groups: moderate earnings and extreme earnings based on whether the absolute value of their earnings changes lies above or below the yearly median. Firms falling below the median are classified as moderate and firms falling above the median as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table C-3 The effect of the extremity of working capital from operations on the incremental information content of cash flow from operations and working capital from operations whilst controlling for the extremity of cash flow: contextual model with a dummy variable approach regression results for the sub-sample of moderate cash flow (model 3)

$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \varepsilon_{it}$															
Coefficients (t-statistics)															
Year	N	$\alpha 0$	$\alpha 1$	$\alpha 2$	$\alpha 3$	$\alpha 4$	$\alpha 5$	$\alpha 6$	$\alpha 7$	$\alpha 8$	Sum of ($\alpha 1 + \alpha 3$)	Sum of ($\alpha 2 + \alpha 4$)	Sum of ($\alpha 5 + \alpha 7$)	Sum of ($\alpha 6 + \alpha 8$)	Adj. R ²
Panel A: cross-sectional regressions															
1996	460	-0.15	6.39	-1.44	-0.001	0.09	-4.86	1.88	0.84	-0.39	6.389	-1.35	-4.02	1.49	0.1
1997	507	-0.42	11.15	-2.63	-0.13	1.93	-9.68	3.9	1.26	-1.9	11.02	-0.7	-8.42	2	0.17
1998	526	-0.34	8.6	-1.59	-0.35	1.79	-6.54	2.83	1.18	-1.55	8.25	0.2	-5.36	1.28	0.18
1999	492	0.05	3.37	0.55	-1.55	1.02	-0.42	1.04	1.02	-0.95	1.82	1.57	0.6	0.09	0.12
2000	450	-0.17	8.43	-2.98	1.23	-0.81	-5.81	2.74	-0.25	0.64	9.66	-3.79	-6.06	3.38	0.1
2001	496	-0.5	8.12	2.34	3.6	1.01	-7.2	0.22	-1.75	-0.09	11.72	3.35	-8.95	0.13	0.29
2002	502	-0.34	1.23	0.97	2.56	0.2	-0.28	2.1	-0.67	-0.53	3.79	1.17	-0.95	1.57	0.18
Mean		-0.27	6.76	-0.68	0.77	0.75	-4.97	2.1	0.23	-0.68	7.52	0.07	-4.74	1.42	0.16
t value		(-3.76)***	(5.25)***	(-0.91)	(1.13)	(2.01)**	(-3.77)***	(4.57)***	(0.54)	(-2.08)**	(5.36)***	(0.07)	(-3.5)***	(3.33)***	
Panel B: pooled cross- sectional time-series Regression															
Pooled	3433	-0.29	7.16	-0.98	0.75	0.91	-5.51	3.04	0.22	-0.66	7.91	-0.07	-5.29	2.38	0.13
t value		(-4.03)***	(5.61)***	(-1.82)*	(1.48)	(2.19)**	(-4.43)***	(11.68)***	(0.89)	(-1.9)*	(6.22)***	(-0.08)	(-4.39)***	(8.84)***	

Notes:

- N represents the number of firm-year observations for each year, and for the total number of observations respectively.
- R_{it} is the annual market adjusted stock return of firm i measured over the fifth month of year t to the fourth month of year $t+1$.
- ΔE_{it} (E_{it}) is the change (level) in working capital from operations and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm i in year t . These variables are deflated by the market value of equity at the beginning of year t .
- Mean represents the mean of the 7 yearly coefficients, and the t -statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
- Sum of ($\alpha_5 + \alpha_7$) is the sum of the estimated coefficients of the change and level of working capital from operations in the existence of its extremity.
- Sum of ($\alpha_6 + \alpha_8$) is the sum of the estimated coefficients of the change and level of moderate cash flow from operations conditioned on the extremity of working capital from operations.
- In pooled cross- sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- The whole sample of each year has been divided into two sub-samples: a moderate cash flow sub-sample and an extreme cash flow sub-sample. The sample in model 3 is the sub-sample of moderate cash flow from operations observations. Moderate cash flow is defined as the observations which the absolute value of their cash flow from operations changes lie below the yearly median. Moderate cash flow from operations observations, in this sub-sample, are classified into two groups moderate working capital from operations and extreme working capital from operations based on whether the absolute value of their working capital from operations changes lies above or below the yearly median. Firms falling below the median are classified as moderate and firms falling above the median as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Notes:

- N represents the number of firm-year observations for each year, and for the total number of observations respectively.
- R_{it} is the annual market adjusted stock return of firm i measured over the fifth month of year t to the fourth month of year $t+1$.
- ΔE_{it} (E_{it}) is the change (level) in working capital from operations and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm i in year t . These variables are deflated by the market value of equity at the beginning of year t .
- Mean represents the mean of the 7 yearly coefficients, and the t-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3 143 (0.01 level), 1 943 (0.05 level) and 1 440 (0.10 level).
- Sum of ($\alpha_5 + \alpha_7$) is the sum of the estimated coefficients of the change and level of working capital from operations in the existence of its extremity.
- Sum of ($\alpha_6 + \alpha_8$) is the sum of the estimated coefficients of the change and level of moderate cash flow from operations conditioned on the extremity of working capital from operations.
- In pooled cross- sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- The whole sample of each year has been divided into two sub-samples: a moderate cash flow sub-sample and an extreme cash flow sub-sample. The sample in model 3 is the sub-sample of moderate cash flow from operations observations. Moderate cash flow is defined as the observations which the absolute value of their cash flow from operations changes lie below the yearly median. Moderate cash flow from operations observations, in this sub-sample, are classified into two groups: moderate working capital from operations and extreme working capital from operations based on whether the absolute value of their working capital from operations changes lies above or below the yearly median. Firms falling below the median are classified as moderate and firms falling above the median as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table C-4 The effect of the extremity of working capital from operations on the incremental information content of cash flow from operations and working capital from operations whilst controlling for the extremity of cash flow: contextual model with a dummy variable approach regression results for the sub-sample of extreme cash flow (model 4)

$$R_{it} = \alpha_{0t} + \alpha_{1t} \Delta E_{it} + \alpha_{2t} \Delta CF_{it} + \alpha_{3t} E_{it} + \alpha_{4t} CF_{it} + \alpha_{5t} D_{it} \times \Delta E_{it} + \alpha_{6t} D_{it} \times \Delta CF_{it} + \alpha_{7t} D_{it} \times E_{it} + \alpha_{8t} D_{it} \times CF_{it} + \varepsilon_{it}$$

Coefficients (t-statistics)

Year	N	a0	a1	a2	a3	a4	a5	a6	a7	a8	Sum of (a1+a3)	Sum of (a2+a4)	Sum of (a5+a7)	Sum of (a6+a8)	Adj.R ²
Panel A: cross-sectional regressions															
1996	461	-0.13	3.08	-0.09	0.22	0.07	-2.55	0.41	0.65	-0.5	3.3	-0.02	-1.9	-0.09	0.12
1997	508	-0.31	2.11	-0.34	-0.01	0.46	-2.15	0.29	1.12	-0.5	2.1	0.12	-1.03	-0.21	0.21
1998	527	-0.32	4.15	0.09	0.79	-0.13	-3.37	0.02	-0.17	0.23	4.94	-0.04	-3.54	0.25	0.15
1999	492	0.02	4.08	-0.48	-0.69	0.48	-3.29	0.46	0.6	-0.43	3.39	0	-2.69	0.03	0.05
2000	450	-0.13	2.48	0.48	1.23	-0.76	-1.95	-0.58	-0.99	1.04	3.71	-0.28	-2.94	0.46	0.09
2001	496	-0.28	2.13	0.39	2.38	0.21	-2.13	-0.66	-1.18	0.38	4.51	0.6	-3.31	-0.28	0.35
2002	502	-0.22	2.23	-0.21	1.01	0.61	-1.79	-0.04	-0.18	-0.47	3.24	0.4	-1.97	-0.51	0.22
Mean		-0.2	2.9	-0.02	0.71	0.14	-2.46	-0.02	-0.02	-0.04	3.6	0.11	-2.48	-0.05	0.17
t value		(-4.2)***	(8.54)***	(-0.17)	(1.88)*	(0.76)	(-10.22)***	(-0.08)	(-0.07)	(-0.16)	(10.28)***	(0.99)	(-7.34)***	(-0.4)	

Panel B: pooled cross-sectional time-series regression

Pooled	3436	-0.21	2.83	-0.12	0.78	0.27	-2.49	0.04	-0.12	-0.09	3.61	0.15	-2.61	-0.05	0.15
t value		(-5.12)***	(9.06)***	(-0.96)	(2.36)**	(1.78)*	(-9.8)***	(0.32)	(-0.49)	(-0.54)	(17.21)***	(1.05)	(-10.43)***	(-0.32)	

Notes:

- N represents the number of firm-year observations for each year, and for the total number of observations respectively.
- R_{it} is the annual market adjusted stock return of firm i measured over the fifth month of year t to the fourth month of year $t+1$.
- ΔE_{it} (E_{it}) is the change (level) in working capital from operations and ΔCF_{it} (CF_{it}) is the change (level) in cash flow from operations for firm i in year t . These variables are deflated by the market value of equity at the beginning of year t .
- Mean represents the mean of the 7 yearly coefficients, and the t-statistic of the mean is obtained by dividing the mean by its standard error. Significance level at six degrees of freedom are 3.143 (0.01 level), 1.943 (0.05 level) and 1.440 (0.10 level).
- Sum of (a_5+a_7) is the sum of the estimated coefficients of the change and level of working capital from operations in the existence of its extremity.
- Sum of (a_6+a_8) is the sum of the estimated coefficients of the change and level of extreme cash flow from operations conditioned on the extremity of working capital from operations.
- In pooled cross-sectional time-series regression, White cross-section method is employed to control for the potential effects of heteroskedastic and autocorrelation in the errors.
- The whole sample of each year has been divided into two sub-samples: a moderate cash flow sub-sample and an extreme cash flow sub-sample. The sample in model 4 is the sub-sample of extreme cash flow from operations observations. Extreme cash flow is defined as the observations which the absolute value of their cash flow from operations changes lie above the yearly median. Extreme cash flow from operations observations, in this sub-sample, are classified into two groups: moderate working capital from operations and extreme working capital from operations based on whether the absolute value of their working capital from operations changes lie above or below the yearly median. Firms falling below the median are classified as moderate and firms failing above the median as extreme. $D_{it} = 0$ for moderate firms and $D_{it} = 1$ for extreme firms.
- ***, **, * Denotes statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Appendix D: Firms' list

Firms included in sample

- 1634 British firms for testing the incremental information content of earnings and cash flow from operations and the effect of extreme earnings on the incremental information content of cash flow and earnings (the first stage in this study).
- 1634 British firms for testing the incremental information content of working capital from operations and cash flow from operations and the effect of extreme working capital from operations on the incremental information content of cash flow and working capital from operations (the second stage in this study).
- 1632 British firms for testing the incremental information content of earnings, working capital from operations and cash flow from operations. (To ascertain from the conclusion derived from the results of the two stages together).

Overall, there are 1640 distinct firms in this study. The following is a list of the names of these firms as shown on the DataStream database.

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Name	Name
CYBERES DEAD - DELIST 24/12/2004	FENNER
INTERCEDE GROUP	BSS GROUP
MATRIX COMMS.GROUP	RENOLD
WARTHOG	HM.CNTS.NWSP.HDG. DEAD - T/O 931649
BLAVOD EXTREME SPIRITS	600 GROUP
PATIENTLINE	HOWDEN GROUP DEAD - T/O 901016
CATHAY INTL.HDG.	RICHDSNS.WSTGTH. DEAD - CANCELLATION
CAFFE NERO GROUP	SENIOR
MARLBOROUGH STIRLING DEAD - DELIST 12/05/2005	SIMON GROUP
BLACK ROCK OIL GAS	WELLMAN DEAD - DELIST 06/04/1998
ATLANTIC GLOBAL	WHESOE DEAD - T/O 983807
TRANSWARE DEAD - DELIST 07/01/2004	APV DEAD - T/O 905110
SPORTS CAFE HOLDINGS	HAWTAL WHITING DEAD - DEAD 06/06/2001
TRIPLEARC	T & S STORES DEAD - 04/02/2003
ZINCOX RESOURCES	UDO HOLDINGS DEAD - DEAD 06/04/1998
MERCHANT HOUSE	PLASMEC DEAD - DEAD 18/05/1998
MCBRIDE	ASSOCIATED BRIT.ENGR.
ASHBOURNE DEAD - T/O CASH 04/97	STANLEY LEISURE
JJB SPORTS	TRIPLEX LLOYD DEAD - T/O CASH
HYDRO INTERNATIONAL	ELLIOTT (B) DEAD - DELIST 08/06/1998
FOCUS DYNAMICS DEAD - T/O BY CASH	JONES & SHIPMAN DEAD - DEAD 12/11/1999
TELEWEST COMMS. DEAD - 15/07/2004	NEEPSSEND DEAD - T/O 914260
CLYDEPORT DEAD - DEAD 14/02/2003	CARBO SUSP - 29/03/2005
K3 BUSINESS TECH.GP.	WEIR GROUP
BRITISH SKY BCAST.GROUP	GEI INTL. DEAD - 19/10/2000
MEMORY CORP. DEAD - DELISTED	BRIDPORT DEAD - DEAD 01/11/1999
ADVANCED MED.SLTN.GP.	FIRTH RIXSON DEAD - DEAD 03/03/2003
DEE VALLEY GROUP	LOCKER GROUP DEAD - 18/01/2002
DEE VALLEY GROUP NV.	RANSOMES DEAD - DELIST 07/04/1998
ATLANTIC TELECOM DEAD - 16/01/2002	CLAYHITHE
PROTEOME	BANDT DEAD - T/O 19/11/1999
TRINITY CARE DEAD - 28/02/2002	CONCENTRIC DEAD - T/O BY CASH
LIBERFABRICA DEAD - DEAD 19/11/1999	EXPAMET INTL. DEAD - 18/06/2001
GET GROUP	AGA FOODSERVICE
COLLEAGUES GP.	SPIRAX-SARCO
ALBRIGHT & WILSON DEAD - DEAD 03/09/1999	WAGON
DATRONTECH DEAD - DEAD 22/11/2001	ADWEST AUTOMOTIVE DEAD - DEAD 13/05/1999
BEALE	GKN
EXPRO INTL.	HALL ENGINEERING DEAD - DEAD 29/07/1999
AMCO	STAVELEY INDS. DEAD - 30/11/2000
PTS DEAD - DEAD 26/10/1999	TI GROUP DEAD - DEAD 04/12/2000
PRECOAT INTL. DEAD - 28/01/2003	WOLSELEY
VISION GROUP DEAD - DEAD 08/04/1999	ENODIS
BIOCOMPATIBLES	BIBBY (J) DEAD - DELISTED 06/97
CORAL PRODUCTS	ALEXANDRA
GENERAL CABLE DEAD - DEAD 17/11/1998	UNILEVER (UK)
COBURG GROUP	ASDA GROUP DEAD - T/O BY 916548
FIRST GROUP	CULLEN'S HDG. DEAD - DEAD 08/09/1997
ANTONOV	NORTHERN FOODS
SR PHARMA	TESCO
STOVES GROUP DEAD - DEAD 17/03/2001	UNIQ
MOOREPAY GP. DEAD - DEAD 21/03/2000	ASSOCIATED BRIT.FOODS
FORMSCAN	OSBORNE & LITTLE DEAD - 26/08/2003

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LORIEN	BUDGENS DEAD - DEAD 16/09/2002
OLD ENG.INNS DEAD - DEAD 07/11/2001	UNITED BISCUITS DEAD - DEAD 16/06/2000
CHARACTER GROUP	GRAND MET. DEAD - MERGER 900251
OASIS STORES DEAD - 25/09/2001	SAVOY HOTEL 'A' DEAD - T/O CASH
UNIVERSE GROUP	SAVOY HOTEL 'B' DEAD - T/O CASH
VOSS NET	BIRSE GROUP
CREOS INTL. DEAD - DEAD 15/09/1999	ISOTRON
UNIVERSAL SALVAGE	CORNWELL PARK. DEAD - DEAD 05/02/2001
PARTCO DEAD - DEAD 13/08/1999	CORNWELL PARK.'A' DEAD - EX.INTO 900883
BEAZER GROUP DEAD - 11/04/2001	BT GROUP
WELLINGTON HOLDINGS DEAD - T/O BY 900575	DIXONS GROUP
WASTE RECYCLING DEAD - 29/07/2003	WEMBLEY GROUP
SLG REALISATIONS DEAD - DELIST 03/09/2002	FORWARD TECH. DEAD - DEAD 01/03/2000
DOMNICK HUNTER	PHOTO-ME INTL.
INSPEC DEAD - DEAD 24/11/1998	AVON RUBBER
NOVARA DEAD - 27/06/2001	CHLORIDE GROUP
AVAILEON DEAD - DEAD 06/12/2001	SMITHS GROUP
TRAFFICMASTER	BRITAX INTERNATIONAL DEAD - DEAD 03/10/2001
ROBERT WISEMAN DAIRIES	CAFFYNS
TECTEON	DAVIS SERVICE GROUP
NIGHTFREIGHT DEAD - DEAD 20/03/2001	RAC DEAD - T/O BY 901503
ILION GROUP DEAD - DEAD 12/11/1999	BP
KELLER	BURMAH CASTROL DEAD - 13/09/2000
OXFORD MOLECULAR DEAD - DEAD 25/09/2000	PREMIER OIL
DRS DATA	ROYAL DUTCH SHELL B
GO-AHEAD GROUP	INSTEM DEAD - DELISTED
HEALTHCALL DEAD - DEAD	CHARTER
VYMURA DEAD - TAKEOVER	SYGEN INTERNATIONAL
PALADIN RESOURCES	FINLAY (JAMES) DEAD - 26/09/2000
DENBY GROUP DEAD - DEAD 16/09/1999	ELEMENTIS
NORCOR DEAD - DEAD 29/02/2000	INCHCAPE
AUTOMOTIVE PRECN. DEAD - DEAD 05/10/2004	BLAGDEN DEAD - 22/08/2000
LONDON CLUBS INTL.	NOVAR DEAD - T/O BY 14305X
CASELL DEAD - DEAD 02/03/1999	API GROUP
CAMAS DEAD - DEAD 24/07/1997	REXAM
UPF GROUP DEAD - DEAD 01/03/1999	BUNZL
AMEY DEAD - DEAD 26/06/2003	REED ELSEVIER
VCI DEAD - DELISTED	4IMPRINT GROUP
CPL AROMAS DEAD - DEAD 14/04/2000	TRINITY MIRROR
BLOOMSBURY PBL.	UNITED BUSINESS MEDIA
COMMUNISIS	LAIRD GROUP
LAWRENCE	HAMPDEN GROUP DEAD - DEAD 29/11/1999
JBA HOLDINGS DEAD - T/O BY CASH	VICKERS DEAD - DEAD 20/12/1999
UCM GROUP	BIDCORP DEAD - DELIST 02/08/2004
CROWN SPORTS	PENINSULAR & OR.STM.NAV
IMAGINATION TECHNOLOGIES	BRANDON HIRE
COLUMBUS GP. DEAD - DEAD 01/08/2000	PARTRIDGE FINE
COPYRIGHT PROMOTIONS DEAD - DELISTED	DELTA
PUBS 'N' BARS	JOHNSON MATTHEY
RAM INVESTMENT GROUP	MCKECHNIE DEAD - DEAD 27/10/2000
OSMETECH	MANGANESE BRONZE HDG.
COMPEL GROUP	VARDY (REG)
GAMES WORKSHOP	HAYS
SERVISAIR DEAD - DEAD 22/06/1999	JOHNSON SERVICE GROUP

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AFRICAN GOLD	SEMARA HOLDINGS DEAD - DEAD 22/03/2000
ABACUS RECRUITMENT DEAD - DEAD 01/03/1999	BENTALLS DEAD - DEAD 31/08/2001
CIVILIAN CONTENT	PENTEX ENERGY
FILTRONIC	BOOTS GROUP
CHURCHILL CHINA	ARCADIA GROUP DEAD - DEAD 09/12/2002
TLG DEAD - DEAD 10/12/1998	GUS
MORRISON DEAD - DEAD 27/12/2000	GT.UNVL.STORES A DEAD - 25/10/1993
WESTMOUNT ENERGY	NEXT
ASK CENTRAL DEAD - DELIST 04/06/2004	LASMO DEAD - T/OVER 03/04/2001
SYSTEMS INTL.GROUP DEAD - 24/12/2001	MARKS & SPENCER GROUP
CELTIC	MOSS BROTHERS GROUP
UNIVENT DEAD - DELIST 14/03/2005	ALLIED TEXTILE DEAD - DEAD 18/08/2000
KS BIOMEDIX HOLDINGS DEAD - DELIST 15/10/2003	COURTS DEAD - DELIST 14/01/2005
CHORION	LAWRIE GROUP DEAD - DEAD 08/10/1999
INDEPENDENT RADIO DEAD - DEAD 24/03/2000	SCAPA GROUP
CALLUNA DEAD - DEAD 28/09/2001	CRODA INTL.DFD
HILL HIRE DEAD - DEAD 10/01/2000	LAING (JOHN)
RM	COURTAULDS DEAD - DEAD 24/09/1998
ZOTEFOAMS	LAING JOHN A DEAD - DEAD
MECONIC DEAD - 23/08/2001	BRIT.MOHAIR DEAD - DEAD 17/11/2000
BTG	FOSTER (JOHN) DEAD - DEAD 26/11/2002
JKX OIL & GAS	CHAPELTHORPE
FURLONG HOMES DEAD - DEAD 10/10/2000	JAMES HALSTEAD
GPE.CHEZ GERARD DEAD - 15/05/2003	MONUMENT OIL&GAS DEAD - DEAD 27/09/1999
SURFACE TECH.SYS.	WARDLE STOREYS DEAD - DEAD 24/03/2000
TRANSPORT SYSTEMS	BRITISH AMERICAN TOBACCO
COMPASS GROUP	POWELL DUFFRYN DEAD - DEAD 17/01/2001
OIL QUEST RESOURCES	TDG
SUPPORTA	BAIRD (WILLIAM) DEAD - 20/01/2003
ADVANCED FLUID CNCTS.	DE LA RUE
KNOWLEDGE TECH.SLTN.	LOW & BONAR
KEYWORLD INVS. SUSP - 30/06/2005	NORCROS DEAD - DEAD 31/01/2000
TRIBAL GROUP	SEARS DEAD - TAKEOVER 02/99
PIPEHAWK	WATERDORM DEAD - DEAD 29/02/2000
REAL AFFINITY	DYSON GROUP
MICHAEL PAGE INTL.	DYSON(J &J)'A' DEAD - DEAD 21/09/1998
ALKANE ENERGY	EXEL
OMG	HAYNES PUBLISHNG
EBOOKERS DEAD - DELIST 01/03/2005	AMSTRAD DEAD - DELISTED
HIDEFIELD GOLD	WESCOL GROUP DEAD - DEAD 28/03/2003
CSS STELLAR	MEYER INTL. DEAD - DEAD 26/06/2000
EUROPEAN DIAMONDS	BAE SYSTEMS
IDOX	METAL BULLETIN
CONDER ENVIRONMENTAL	ROK PR.SOLUTIONS
INCISIVE MEDIA	TUDOR DEAD - DEAD 09/11/1999
STREAM GROUP	PIZZAEXPRESS DEAD - 17/07/2003
MERCURY RCYC.GROUP	GRASEBY DEAD - T/O 900943
MAVERICK ENTM.GP.	M-R GROUP DEAD - DEAD 01/07/1999
IMPRINT	MACRO 4
CYTOMYX HOLDINGS	TBI DEAD - DEAD 02/02/2005
TIKIT GROUP	CARLTON COMMS. DEAD - DELIST 02/02/2004
GW PHARMACEUTICALS	CREATIVE REC SLTN. DEAD - DELIST 22/03/2005
LIDCO GROUP	CABLE & WIRELESS
CORAC GROUP	FEEDBACK

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FORMATION GROUP	GREENWICH COMMS.
ALLTRACEL PHARMS.	WATTS BLAKE BEA. DEAD - TAKEOVER
UKBETTING	SHARPE & FISHER DEAD - DEAD 04/02/2000
INTACT.DIG.SLTN.	IMI
ASOS	RIO TINTO
DELTEX MEDICAL GROUP	RELYON GROUP DEAD - 10/10/2001
ALLIANCE PHARMA	CUSSINS PR.GP. DEAD - DEAD 22/12/1999
EXPOMEDIA GROUP	RUSSELL (ALEX.) DEAD - DEAD 21/06/2001
INDITHERM	POCHIN'S
HUVEAUX	UK SAFETY DEAD - T/O CASH
BIOFOCUS	OCEONICS GROUP DEAD - DEAD 19/12/1996
STILO INTERNATIONAL	MORLAND DEAD - T/O 23/11/1999
EARTHPORT	AMEC
ADVANCE VISUAL COMMS.	BRAMMER
STANLEY GIBBONS GROUP	AIM GROUP DEAD - DELIST 24/08/2004
NEW MEDIA INDS.	JACKS (WILLIAM)
ARC INTERNATIONAL	TT ELECTRONICS
SPORTS RESOURCE GROUP DEAD - 09/07/2003	DRUCK HOLDINGS DEAD - 19/08/2002
MEDIA SQUARE	ASSD.BRIT.PORTS HDG.
DECHRA PHARMACEUTICALS	ACORN GROUP DEAD - DEAD 10/06/1999
WMRC DEAD - 22/10/2002	MAUNDERS (JOHN) DEAD - DEAD T/O
BITS	ZETEX
PROJECT TELECOM DEAD - DELIST 17/10/2003	JEROME GROUP DEAD - DEAD 21/01/1999
COMPANY HEALTH GROUP	LONMIN
KIDDE DEAD - 03/05/2005	SMG
FUSION OIL & GAS DEAD - DELIST 11/02/2004	C D BRAMALL DEAD - 25/03/2004
GEORGICA	BAILEY (CH)
CARNIVAL	BRITISH VITA DEAD - DELIST 14/06/2005
PHOTO-SCAN DEAD - DELIST 30/11/2004	RICARDO
TANDEM GROUP	PLANESTATION GROUP
MUSIC CHOICE EUROPE	LINTON PARK
TTP COMMUNICATIONS	AGGREGATE INDUSTRIES DEAD - T/O BY 14630H
ID DATA	BIOQUELL
CHUBB DEAD - DEAD 27/08/2003	WESTBURY
ITIS HOLDINGS	ROPNER DEAD - T/O 901124
RAFT INTERNATIONAL	RADIUS DEAD - DEAD 26/11/1998
REGUS GROUP	EIS GROUP DEAD - DEAD
NCIPHER	ROPNER 'A' N/V DEAD - DEAD
GAMING	PIFCO HDG.'A' DEAD - DEAD 09/10/1998
CHARTERIS	BELLWAY
AUTONOMY CORP.	NEWS COMMS. & MEDIA DEAD - DEAD 11/07/2000
LOMBARD MEDICAL DEAD - DEAD 28/07/2003	TOMKINSONS DEAD - T/O 911518
BEDE	WORLD OF LEATHER DEAD - T/O 882012
WILINK	BRIT-BORNEO OIL & GAS DEAD - DEAD 07/08/2000
BANK RESTAURANT GROUP	BEN BAILEY
QXL RICARDO	TEMPUS GROUP DEAD - DELIST 17/01/2002
TIMESTRIP	AIR PARTNER
SPORTINGBET	DAILY MAIL & GEN.
LA FITNESS	DEWHURST
REDSTONE	DEWHURST 'A'
MONOTUB INDUSTRIES DEAD - DEAD 23/01/2003	SEDGEMOOR DEAD - DEAD 02/08/1999
HARRIER GROUP	RAMSDEN'S(HARRY) DEAD - DEAD 16/02/2000
THUS GROUP	PENDRAGON

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TERTIARY MINERALS	ABBOTT MEAD VICKERS DEAD - DEAD
CHANNELFLY DEAD - DEAD 01/05/2003	10/02/1999
DOMINO'S PIZZA	COBHAM
SYSTEMS UNION	AWG
JAMIES BARS DEAD - DEAD 31/10/2002	WADDINGTON DEAD - DEAD
PEACOCK GROUP	RELIANCE SCTY.GROUP
NEXT FIFTEEN COMM.	UNITED UTILITIES
SDL	SEVERN TRENT
COUNTRY & METROPOLITAN DEAD - 16/05/2005	SOUTHERN WATER DEAD - T/O BY 928741
DIGITAL CLASSICS	PENNON GROUP
TRANSENSE TECHNOLOGIES	THAMES WATER DEAD - T/OVER-902191
NRX GLOBAL DEAD - DEAD 21/05/2003	PORTS.SUND.NWSP. DEAD - DEAD 16/08/1999
FFASTFILL	HYDER DEAD - DEAD 20/10/2000
EASYJET	INTELLIGENT ENVMS.GP.
RENEURON HOLDINGS DEAD - DEAD 19/05/2003	WESSEX WATER DEAD - DEAD 17/11/1998
FIRSTAFRICA OIL	KELDA GROUP
CALEDON RESOURCES	FIRE EARTH DEAD - DEAD 05/10/1998
BLOOMS OF BRESS.HDG.	CHURCH & CO. DEAD - DEAD 02/02/2000
MELROSE RESOURCES	WOLSTENHLME RNK. DEAD - DEAD 28/09/2000
AI CLAIMS SOLUTIONS	SAGE GROUP
TOTALLY	EAST SURREY HDG.
ACTIF GROUP	ASPINALLS ONLINE DEAD - DELIST 30/10/2003
ESPORTA DEAD - 16/09/2002	ELECTROCOMP.
EAGLE EYE TELEMATICS	BETT DEAD - DEAD 24/06/2003
SCIPHER DEAD - DELIST 22/03/2005	BAGGERIDGE BRICK
ABERDEEN FTBL.CLUB DEAD - DEAD 04/08/2003	AVINGTRANS
IDEAL SHOPPING DIRECT	STYLO
WORLD TELEVISION GROUP	MID-STATES
TOPNOTCH HEALTH CLUBS DEAD - DELIST	CHIME COMMS.
24/11/2003	
DATAFLEX HOLDINGS DEAD - DELIST 07/11/2003	KUNICK DEAD - DEAD 22/07/2002
FORBIDDEN TECHS.	BSTL.UNITED PRESS DEAD - DEAD 23/02/2000
YOOMEDIA	JONES STROUD DEAD - DEAD 09/12/1999
EICOM	DIXON MOTORS DEAD - 19/06/2002
INTERREGNUM	GOLDSMITHS GP. DEAD - DEAD 05/07/1999
LASTMINUTE.COM DEAD - DELIST 20/07/2005	INN BUSINESS DEAD - DEAD 16/11/1999
GENETIX	ABI LEISURE DEAD - DEAD. 18/02/1999
DATAMONITOR	COURTAULDS TEXT. DEAD - T/O BY 757088
GENEMEDIX	ARGOS DEAD - T/O BY 901199
FULCRUM PHARMA	QS GROUP DEAD - DEAD 26/11/2002
WORLD CAREER NETWORK	SAFEWAY (UK)DEAD - DELIST 08/03/2004
RADIO FIRST DEAD - DELIST 02/01/2003	OCEAN WILSONS HOLDINGS
PATSYSTEMS	INVENSYS
CHELFORD GROUP	MOTHERCARE
NETTEC	YULE CATTO
EYRETEL DEAD - DEAD 23/04/2003	ALEXON GROUP
EQ GROUP	AUSTIN REED 'A'
WEALTH MAN.SOFTWARE DEAD - T/O BY 690410	VICTORIA
INNOVATION GROUP	PREMIER FARNELL
ZEN RESEARCH DEAD - DEAD 18/07/2002	QUEENS MOAT HSE. DEAD - DELIST 26/10/2004
COMPASS SOFTWARE GP. DEAD - 15/12/2003	AUSTIN REED GROUP
REGEN THERAPEUTICS	LOADES
ARGONAUT GAMES DEAD - DELIST 31/03/2005	CAIRD GROUP DEAD - DEAD 26/08/1999
KNOWLEDGE SPT.SY. DEAD - DEAD 02/07/2003	COHEN (A) & COMPANY
	COHEN (A) 'A' DEAD - DEAD 12/06/2001

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ELECTRIC WORD	ELLIS & EVERARD DEAD - DEAD 16/02/2001
VIANET GROUP	MORRISON(WM)SPMKTS.
ZOO DIGITAL GROUP	SIGNET GROUP
GETMAPPING DEAD - DELIST 29/10/2003	LPA GROUP
MYRATECH NET	WATMOUGHS HDG. DEAD - T/O CASH
ADVANCED TECHNOLOGY SUSP - 02/03/2005	COOK (WILLIAM) DEAD - T/OVER
BOOKHAM TECHNOLOGY DEAD - DEAD 13/09/2004	MONTPELLIER GROUP
NETSTORE	FINDEL
INTERNET BUSINESS GP.	SEMA DEAD - 11/05/2001
RIDGE MINING	PEEK DEAD - DEAD 21/01/1998
HEALTHCARE ENTS.GROUP	BRAKE BROTHERS DEAD - 19/09/2002
THOMSON INTERMEDIA	FORTNUM & MASON DEAD - 20/12/2001
SERVICE POWER TECH.	LATHAM(JAMES)
SCOTTY GROUP	PORTER CHADBURN DEAD - DEAD 12/09/1999
BETINTERNET.COM	WALKER GREENBANK
TANGENT COMMUNICATIONS	CALA DEAD - DEAD 16/07/1999
ONECLICKHR	CARCLO
I FEEL GOOD DEAD - 14/07/2003	HARDYS & HANSONS
STATPRO GROUP	REXMORE DEAD - T/O 507414
IQE	SIRDAR
STREETNAMES	AYRSHIRE METAL DEAD - DEAD 02/01/2001
WIRELESS GROUP DEAD - T/O BY 907481	HICKING PENTCST. DEAD - TAKEOVER
INVENTIVE LEISURE	PITTARD
TELECITY	MAYBORN GROUP
PODIA GROUP DEAD - 20/03/2002	FRENCH DEAD - 09/04/2002
AERO INVENTORY	BARRATT DEVELOPMENTS
KNOWLEDGE MANAGEMENT DEAD - DEAD 07/10/2002	RANSOM (WM)
SPORTS NETWORK GROUP	WHATMAN
ACTINIC DEAD - 19/07/2002	HEYWOOD WILLIAMS
CATALYST MEDIA GROUP SUSP - 15/11/2004	INVESTINMEDIA
MEDIWATCH	TRUST MOTOR GP. DEAD - DEAD 09/10/1998
INTEC TELECOM SYS.	WILSON BOWDEN
GIARDINO GROUP DEAD - DELIST 20/02/2004	WYNDEHAM PRESS GP.
ORCHESTREAM DEAD - DEAD 17/01/2003	CHRYSLIS GROUP
ONLINE TRAVEL CORP. DEAD - DELIST 01/06/2004	RENTOKIL INITIAL
LOK'N STORE GROUP	ULSTER T V
XP POWER	BETTERWARE DEAD - DEAD 05/03/1998
THEMUTUAL NET	PZ CUSSONS 'A' DEAD - DELIST 29/06/2005
UBC MEDIA GROUP	BURTONWOOD DEAD - T/O 900274
PIPEX COMMUNICATIONS	YOUNG & CO.BREW.'A'
BUSINESS SYS.GP.HDG.	BAILEY (CH) 'B'
ZYTRONIC	UGLAND INTL.HDG. DEAD - DLIST 28/04/2000
GENUS	ALBION
ROBERT WALTERS	ALLIED COLLOIDS DEAD - T/O 885460
CARPHONE WHSE.GP.	DOMINO PRINTING SCIENCES
ALTERIAN	AMBER INDL.HDG.
ISOFT GROUP	APPLEYARD GROUP DEAD - DEAD 26/01/1998
LIBERTY	ARCOLECTRIC HDG. DEAD - DELIST 02/01/2004
EMPIRE INTERACTIVE	ARCOLECTRIC HDG. 'A' DEAD - CONV.TO 910062
PHARMAGENE	ASH & LACY DEAD - 06/11/2000
CLARITY COMMERCE SLTN.	NXT
OASIS HEALTHCARE	SHERWOOD INTL. DEAD - DELIST 09/09/2003
FUTURAGENE	BALDWIN DEAD - DEAD
ITOUCH	BEALES HUNTER DEAD - DEAD 19/11/1998

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WORKPLACE SYSTEMS INTL.	BLACK A&C DEAD - DEAD 09/08/2000
IQ-LUDORUM	BLOCKLEYS DEAD - 03/07/2000
INTERCLUBNET DEAD - DELIST 22/09/2003	BODYCOTE INTL.
B V GROUP DEAD - DELIST 16/09/2003	BOOSEY & HAWKES DEAD - 22/12/2003
COMPUTER SOFTWARE GP.	BRAIME (TF & JH)
INDIGOVISION GROUP	BRAIME (TF & JH) HDG.'A'
WORLD TRAVEL HOLDINGS DEAD - DELIST 17/06/2004	PERSIMMON
MEDICAL HOUSE	RADAMEC GROUP
FOREVER BCAST. DEAD - DELIST 22/03/2004	GAMING INTL. DEAD - DEAD 06/10/2004
SYNIGENCE	BRIT.BLDG.& ENGR. DEAD - T/O 953526
INDE.INTL.INV.RESEARCH	CAIRN ENERGY
VENTURIA	BTP DEAD - DEAD 07/04/2000
CMS WEBVIEW	HARVEYS FURNISHINGS DEAD - DEAD 18/09/2000
WAP INTEGRATORS DEAD - DEAD 27/05/2003	CANTORS 'A' DEAD 03/12/1992 910171
SYMPHONY PLASTIC TECH.	GEEST DEAD - 16/05/2005
LINUX PRINT.TECH. DEAD - DEAD 02/02/2005	CLARKE (T)
WETHERSPOON (JD)	CLYDE BLOWERS DEAD - DELISTED
DORLING KINDER. DEAD - DEAD 27/07/2000	ASHLEY (LAURA) HOLDINGS
CRITCHLEY GP. DEAD - DEAD 28/06/2000	COOPER (FREDERICK) DEAD - DEAD 20/03/2003
NATIONAL EXPRESS	EUROPEAN COLOUR
PAN ANDEAN RESOURCES	RUBICON GP. DEAD - DEAD 23/12/1998
NWF GROUP	CREST NICHOLSON
CANTAB PHARMS. DEAD - DEAD 09/05/2001	CROPPER (JAMES)
VENDOME LUXURY U DEAD - DELIST 25/03/1998	WEW GROUP DEAD - T/O 917570
ALLDERS DEAD - 20/03/2003	CEPS
CREST PACKAGING DEAD - DELISTED	DIPLOMA
ABACUS GROUP	PENNA CONSULTING
DFS FURNITURE CO. DEAD - DELIST 03/11/2004	PRISM LEIS.CORP. DEAD - DEAD 02/02/1999
ROXBORO GROUP	DOWDING & MILLS
HOZELOCK GROUP DEAD - T/O BY CASH	EMAP
RUBEROID DEAD - DEAD 25/05/2000	GIEVES & HAWKES DEAD - 03/07/2002
AZLAN GROUP DEAD - DEAD 31/03/2003	HAGGAS (JOHN) DEAD - DEAD 29/12/1998
BIOTRACE INTL.	HAMPSON INDS.
PARAMOUNT FOODS DEAD - DEAD 05/11/1998	GOODHEAD GROUP DEAD - DEAD 15/06/2000
LITHO SUPPLIES	HAZLEWOOD FOODS DEAD - DEAD 15/02/2001
ROYAL DOULTON DEAD - T/O BY 911847	HEADLAM GROUP
ON DEMAND INFO. DEAD - DEAD 23/12/1998	SHEFFIELD UNITED
GLOW COMMUNICATIONS DEAD - DELIST 29/04/2005	MITIE GROUP
TELSPEC	JACQUES VERT
QSP GROUP DEAD - 05/08/2002	FORTUNE OIL
FULL CIRCLE INDS. DEAD - DEAD 25/10/1999	INTL TOOL & SUPPLY DEAD - DELISTED
DAVID BROWN GP. DEAD - DEAD 02/12/1998	HILTON GROUP
HOLLIDAY CHM.HDG. DEAD - T/O 905310	LESLIE WISE GP. DEAD - DELETED 06/12/1999
TRACKER NETWORK DEAD - DEAD 07/09/1999	LAMONT HDG. DEAD - DEAD 27/03/2003
STAGECOACH GROUP	KALON GROUP DEAD - DEAD 04/05/1999
WSTM.HLTH.CARE DEAD - DEAD 20/05/1999	COUNTRY GARDENS DEAD - DEAD 05/02/2001
DIVISION GP. DEAD - T/O BY CASH	MARLING INDS. DEAD - T/O 983807
ASTRAZENECA	MEGGITT
RPC GROUP	KEWILL SYSTEMS
UK COAL	MS INTERNATIONAL
DREW SCIENTIFIC DEAD - T/O BY 326092	NORTHGATE
CRABTREE GROUP DEAD - DELISTED	PZ CUSSONS
GB GROUP	BOGOD GROUP DEAD - DEAD 03/02/2003

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VIRIDIAN GROUP	PHOENIX TIMBER DEAD - T/OVER
CARPETRIGHT	QUICKS GROUP DEAD - 30/07/2002
DEVRO	ROTORK
FIELD GROUP DEAD - DEAD 06/05/1999	BRITISH POLYTHENE INDS.
METROTECT IND. DEAD - DEAD 10/11/1999	MAYFLOWER CORPORATION SUSP - 31/03/2004
THERATASE	SHILOH
BUSINESS POST GROUP	SLINGSBY (HC)
CELSIS INTL.	SMITH (DS)
MONEY CONTROLS DEAD - DEAD 21/02/2000	NFF DEAD - 31/07/2001
CAPITAL CORP. DEAD - DEAD 29/07/1999	TAYLOR NELSON SOFRES
GTL RESOURCES SUSP - 29/06/2005	DAILY MAIL 'A'
VHE HOLDINGS DEAD - DEAD 07/12/2001	SHERWOOD GROUP
RACKWOOD MINERAL HDG. DEAD - DEAD 19/11/1999	HEMSCOTT
ALPHA AIRPORTS	HALMA
CHIROSCIENCE GP. DEAD - DEAD 30/09/1999	EUROTUNNEL SA UNITS
SLIMMA	INFAST GROUP
IDS GROUP DEAD - DELIST 04/09/2003	CORPORATE SVS.GP.
CODA GROUP	WILLOUGHBY'S CONS. DEAD - DEAD
ENERGY CAPITAL INV. DEAD - 15/07/2004	BISICHI MINING
TRIFAST	BERADIN HOLDINGS DEAD - 11/07/2001
CLINICAL COMPUTING	BERTAM HOLDINGS DEAD - MERGED 991575
HANOVER INTL. DEAD - DELIST 27/10/2003	HIDONG ESTATE
TRING INTL. DEAD - DEAD 26/11/1998	LENDU HOLDINGS DEAD - MERGED 991575
CONTENTFILM	SINGAPORE PARA DEAD - 11/07/2001
GOLDBGH.HLTHCR. DEAD - T/O CASH	WATER HALL GROUP
GRAHAM GROUP DEAD - T/O BY 901405	RING DEAD - DEAD 17/08/2000
FINELIST GROUP DEAD - DEAD 08/06/2000	STERLING INDS. DEAD - DEAD 15/02/2000
RADSTONE TECHNOLOGY	STIRLING GP. DEAD - DELIST 10/12/2003
MIDL.INDE.NWSP. DEAD - DEAD 07/04/1998	PETERHOUSE GROUP DEAD - DELIST 14/07/2004
UNITED CARRIERS DEAD - DEAD 20/08/1999	SYMONDS DEAD - DELISTED
CEDAR DEAD - DEAD 04/03/2002	ECLIPSE BLINDS DEAD - DELISTED
MEDIA BUSINESS DEAD - T/O BY CASH	TIME PRODUCTS DEAD - DEAD 17/08/2001
REUNION MINING DEAD - DEAD 14/06/1999	TOYE & COMPANY
PRESTON NORTH END	WACE GROUP DEAD - DEAD 21/05/1999
METRODOME GROUP	SPRINGWOOD DEAD - DELIST 19/04/2004
CHUBB SECURITY DEAD - T/OVER	ARCADIAN INTL. DEAD - DEAD 07/04/1998
MERSEY DOCKS & HARBOUR	WILSON CONNOLLY DEAD - DELIST 25/11/2003
TEPNEL LIFE SCI.	WORTHINGTON GROUP
TULLOW OIL	PADANG SENANG DEAD - 11/07/2001
SCOT.HIGHLD.HOTELS DEAD - DEAD 28/09/1999	GAUCHO GRILL DEAD - DEAD 04/07/2002
DENNIS GROUP DEAD - DEAD 20/01/1999	FKI
YORK WTW.NV.'A' DEAD - T/O BY 904486	HEWETSON DEAD - DELISTED
HODDER HEADLINE DEAD - DEAD 26/08/1999	ELECTRONIC DATA PROC.
CAPITAL INDS. DEAD - DEAD 15/06/1999	FISHER (JAMES)
BRISTOL WATER GROUP	CREIGHTONS
AVONSIDE DEAD - DEAD 22/06/1999	SUNLEIGH DEAD - DEAD 19/06/1999
WASTE MAN.INTL. DEAD - DEAD 03/11/1998	SPANDEX DEAD - DEAD/DELISTED
HUGHES (TJ) DEAD - 21/05/2002	FIRST CHOICE HOLDS.
REGENT INNS	ASPEN GROUP DEAD - TO BY 983807
SLUG & LETTUCE DEAD - DEAD 31/10/2000	MERCHANT RETAIL
HARTLEPOOL WATER DEAD - T/O 904327	BG GROUP
VEGA GROUP	GASKELL SUSP - 16/03/2005
KENWOOD APP. DEAD - 17/04/2001	SHOPRITE GROUP
COUNTRY CASUALS DEAD - T/O BY 905536	JOHNSTON GROUP DEAD - T/O BY 910473

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ANGLIAN GROUP DEAD - DEAD 08/06/2001	KELSEY INDS. DEAD - DEAD 11/02/2000
VERNALIS	EUROTHERM DEAD - DEAD 15/09/1998
XENOVA GROUP	EURODIS ELECTRON SUSP - 15/07/2005
HOUSE OF FRASER	WYKO DEAD - DEAD 12/11/1999
REDROW	MERISTEM DEAD - DEAD 14/04/2000
HOST EUROPE DEAD - DELIST 18/06/2004	LIBERTY DEAD - 03/08/2000
RANGE COOKER COMPANY DEAD - DEAD 13/01/2003	REAL TIME CNTL. DEAD - DELIST.26/04/2000
BOUSTEAD SUSP - 07/02/2005	KODE INTL. DEAD - T/O CASH 05/98
SCS UPHOLSTERY	CTL.TRAN.RENTAL DEAD - T/O CASH
AUTOLOGIC	METALRAX GROUP
BOVIS HOMES GROUP	LAMBERT HOWARTH
TERENCE CHAPMAN GROUP DEAD - 18/11/2002	HUNTLEIGH TECH.
ENERGIS DEAD - DEAD 16/07/2002	BEATTIE (JAMES)
GOOCH AND HOUSEGO	TUNSTALL GROUP DEAD - T/O BY CASH
HACAS GROUP DEAD - 19/08/2003	HEWDEN-STUART DEAD - DEAD 16/02/2001
BCO TECHNOLOGIES DEAD - 04/09/2000	ALLDAYS DEAD - DELIST 15/01/2004
KINGSTON COMMUNICATIONS	RIO TINTO BR. DEAD - 20/06/2001
OPTOPLAST DEAD - 13/06/2002	HOWARD HOLDINGS DEAD - DEAD 10/12/2002
BOND INTL.SOFTWARE	KALAMAZOO CMPTG. DEAD - 22/01/2002
DEBENHAMS DEAD - DELIST 05/12/2003	RESTAURANT GROUP
FALKLAND ISLANDS HDG.	GREENWICH RESOURCES
MONSOON	PEARSON
QUADRANT HEALTHCARE DEAD - 20/02/2001	CASTINGS
SAFESTORE DEAD - DELIST 15/10/2003	QUARTO GROUP
ELDRIDGE POPE DEAD - DELIST 16/11/2004	CRANSWICK
LONRHO AFRICA	IBC GROUP DEAD - DEAD 26/03/1999
GUARDIAN IT DEAD - 30/07/2002	ARRIVA
PENNANT INTL.GROUP	WIDNEY
PEEL HOTELS	AIRFLOW STREAMLINES SUSP - 01/12/2003
ARLA FOODS	CHE HOTEL GROUP
VI GROUP	ARMITAGE BROS. DEAD - DEAD 14/05/2003
OXFORD GLYCOSCIENCES DEAD - 21/07/2003	BRIT.FITTINGS DEAD - DEAD 20/07/1999
T&F INFORMA	CHAMBERLIN & HILL
OTTAKARS	CRADLEY GROUP HDG.
DESIRE PETROLEUM	MISYS
ARM HOLDINGS	GALLIFORD TRY
CONVERGENT COMMS. DEAD - DELIST 01/12/2003	GIBBS & DANDY
AMBISHUS PUB COMPANY DEAD - DEAD 08/12/2000	GIBBS &.DANDY 'A' DEAD - DELIST 20/04/2004
THOMSON TRAVEL GP. DEAD - 15/09/2000	GOODWIN
DIMENSION RESOURCES	LEIGH INTERESTS DEAD - T/O CASH
TOUCH GROUP	LILLESHALL DEAD - 08/02/2001
COMPUTACENTER	NOBO GROUP DEAD - DEAD 14/10/1997
ICM COMPUTER	NORTH MIDLAND CON.
QUANTICA	ARABIS DEAD - T/O 910379
JAMES R KNOWLES HDG.	MORGAN SINDALL
ITNET DEAD - T/O BY 943663	THORPE (FW)
GOLDSHIELD GROUP	UNITED INDS. DEAD - DEAD 27/09/2002
BRIT.REGIONAL AIRLINES DEAD - 07/08/2001	WALKER (THOMAS)
NEW LOOK DEAD - DELIST 07/04/2004	WASSALL DEAD - DELIST.05/05/2000
ATA GROUP	SOLVERA DEAD - DEAD 12/03/1999
GOURMET HOLDINGS	MEDICAL SOLUTIONS
TCT INTERNATIONAL DEAD - 19/02/2002	BEARING POWER INTL. DEAD - DEAD 05/03/1999
ANGLO SIBERIAN OIL CO. DEAD - DEAD 02/06/2003	WOOD (ARTHUR) DEAD - DEAD 09/12/2002
ECSOFT GROUP DEAD - DEAD 19/02/2003	BILSTON &.BSEA.ENML. DEAD - DEAD 19/06/2003

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INTERIOR SERVICES GROUP	EUROPOWER DEAD - 17/06/2002
SELFRIDGES DEAD - DELIST 17/09/2003	BLICK DEAD - DELIST 16/02/2004
FUNDAMENTAL-EINVESTMENT SUSP - SUSP 21/03/2005	WILLIAMS DEAD - DEAD 09/11/2000
SIRIUS FINL.SLTN.	MENVIER-SWAIN DEAD - T/O BY CASH
TOUCHSTONE GROUP	EVE GROUP DEAD - DEAD 01/03/2000
TOROTRAK	BROWN (N) GROUP
ULTIMATE LEISURE GROUP	EVANS HALSHAW DEAD - DELISTED
CARILLION	IPECO HOLDINGS DEAD - T/O CASH 09/97
EXCHANGE FS GROUP DEAD - 14/12/2001	WT FOODS DEAD - 19/12/2001
COCA COLA BEVERAGES DEAD - DEAD 09/08/2000	MAISHA
BALDWINS INDL.SERVICES DEAD - DEAD 25/04/2003	EMESS
RDF GROUP	ALBERT FISHER DEAD - DEAD 15/07/2002
CARRWOOD	HOLT (JOSEPH) DEAD - T/O BY 28/03/2000
PREMIER DIRECT GROUP	BPP HOLDINGS
MEDIA CONTENT DEAD - DEAD 27/01/2003	NICHOLS
INTER LINK FOODS	CADORO DEAD - DEAD 14/06/2000
IFTE DEAD - DELIST 20/10/2003	KWIK-FIT HDG. DEAD - DEAD 03/08/1999
METNOR GROUP	WILSHAW
LTG TECHNOLOGIES	ALUMASC GROUP
NATURAL BUILDINGS MATS. DEAD - DEAD 15/08/2000	MACFARLANE GROUP
TELECOM PLUS	AFRICAN LAKES DEAD - DEAD 03/03/2003
HONEYCOMBE LEISURE	BURNDENE INVS. DEAD - DELIST 16/04/2004
MANPOWER SOFTWARE	METSEC DEAD - DEAD T/O
CONNAUGHT	CRAIG & ROSE DEAD - DEAD 23/08/1999
FINANCIAL OBJECTS	BRITISH AIRWAYS
RDL GROUP DEAD - 11/04/2003	FIFE GROUP DEAD - DEAD 14/09/1999
NBA QUANTUM	GRAMPIAN TV. DEAD - T/O BY 902402
SYNSTAR T/O BY 905277	SWAN (JOHN) & SONS
SABMILLER	THE GGT GROUP DEAD - T/O BY CASH
AXON GROUP	YORK WATERWORKS DEAD - T/O BY 904486
MORSE	M & W DEAD - T/O 900616
IMS MAXIMS	PROTHERICS
AFFINITY INTERNET DEAD - DEAD 06/08/2003	PARAMOUNT DEAD - DELSIT 10/06/2005
BELL GROUP DEAD - DELIST 27/07/2004	ARJO WIGGINS APL. DEAD - DEAD 24/08/2000
JETCAM INTL. HLDG DEAD - DELIST 19/09/2003	MARK KINGSLEY
ROBOTIC TECHNOLOGY SYS.	ATLAS CONVERTING DEAD - T/OVER
GLOTEL	RENISHAW
GROUP NBT	BOGOD GROUP 'A' DEAD - DEAD 03/02/2003
FUTURE	MMT COMPUTING DEAD - 18/12/2003
SFI GROUP DEAD - DEAD 12/05/2003	FERRARIS GROUP
ANGLO UNITED DEAD - DELIST 19/01/1998	FORTRESS HOLDINGS DEAD - DELIST 28/02/2005
BOWNESS LEISURE DEAD - DEAD 28/11/2001	PILKINGTON
PHILIPPINE GOLD DEAD - DEAD	APPLIED OPTICAL TECHS.
EUROMONEY INSTL.INVESTOR	HTV GROUP DEAD - T/O 901106
SOUTHERN VECTIS DEAD - T/O BY 135565	FABER PREST DEAD - DEAD 02/06/1998
YATES GROUP DEAD - DELIST 13/10/2004	HUNTING
WILLOUGHBY PF.	SPRING RAM CORP. DEAD - DEAD 19/08/1999
NETCENTRIC	POWERSCREEN DEAD - T/O BY 905253
TADPOLE TECHNOLOGY	ANITE GROUP
INCEPTA GROUP DEAD - T/O BY 901156	BLACKS LEISURE
EMERALD ENERGY	INTERNATIONAL EN.GP. DEAD - 26/05/2005
NSB RETAIL SYSTEMS	FULLER SMITH 'A'
ALIZYME	KWIK SAVE GP. DEAD - MERGE 882048

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COFFEE REPUBLIC	AEGIS GROUP
HERITAGE BATHROOMS DEAD - T/O BY CASH	BRITTON GP. DEAD - T/O 327312
INTERNATIONAL GREETINGS	BULMER (HP) DEAD - 29/07/2003
VERO GROUP DEAD - T/O BY 937661	HEAVITREE BREWERY
NATIONAL GRID TRANSCO	REED EXECUTIVE DEAD - DEAD 19/06/2003
ACAMBIS	PLYSU DEAD - DEAD 07/02/2000
L GARDNER GP. DEAD - DEAD 23/05/2003	HEATH (SAMUEL)
REVELATION PICADILLY HDG.	NORTHERN RACING
JASMIN SUSP - 27/01/2004	REGAL HOTEL GP. DEAD - DEAD 17/10/2000
CMG DEAD - DEAD 30/12/2002	SPERATI (CA)
FINSBURY FOOD	ANGLO EASTERN PLTN.
FLOMERICS GROUP	JARVIS PORTER GROUP
GEARHOUSE GROUP DEAD - 25/10/2001	MCLEOD RUSSEL DEAD - DELIST 19/02/2004
POLYMASC DEAD - DEAD 22/11/1999	JERSEY ELTY.'A'
CENTURY INNS DEAD - DEAD 18/06/1999	STRATAGEM GROUP DEAD - 29/10/2002
VICTREX	BESPAK
NORTHERN PETROLEUM	WPP GROUP
MEDIAKEY DEAD - DEAD 25/01/2001	DAWSON HOLDINGS
JUMBO INTERNATIONAL DEAD - 01/09/2003	ELDRIDGE POPE 'A' DEAD - DELIST 27/04/1998
STREAMLINE HOLDINGS DEAD - DEAD 23/07/1998	FITCH DEAD - DEAD 24/06/1999
EASYNET GROUP	POLYPIPE DEAD - T/O BY 901704
IOC INTL DEAD - DEAD 02/08/1999	INTEREUROPE TECH. DEAD - DEAD 19/08/1999
STADIUM GROUP	MANAGEMENT CNSL.GP.
INTERNET TECHNOLOGY GP. DEAD - T/OVER 07/03/1999	ANTOFAGASTA
COLT TELECOM	ADMIRAL DEAD - DEAD 17/08/2000
TRIAD GROUP	WYEVALE GDN.CENTRES
FULMAR	MCCARTHY & STONE
FARSIGHT	MATTHEWS(BERNARD) DEAD - DEAD 15/01/2001
FLYING BRANDS	TEX HOLDINGS
SIRVIS IT	BARBOUR INDEX DEAD - DEAD 30/06/1999
ORANGE DEAD - DEAD 10/02/2000	WHITE YOUNG GREEN
DICOM GROUP	HARRIS (PHILIP) DEAD - T/O BY 135515
XANSA	GARTON ENGR. DEAD - DEAD 20/08/2002
CHELSEA VILLAGE DEAD - 26/08/2003	BORDER TV. DEAD - DEAD
AVOCET MINING	CARR'S MILLING
REBUS GROUP DEAD - DEAD 29/04/1999	BOOT (HENRY)
MILLENNIUM & CPTH.HTLS.	HAY (NORMAN)
PHYTOPHARM	CARE UK
ROMTEC DEAD - DEAD 28/07/2000	STAKIS DEAD - T/O BY 910437
HARVEY NICHOLS DEAD - DEAD 29/01/2003	LYLES (S) DEAD - DEAD 23/12/1999
VERNALIS GROUP DEAD - DELIST 22/10/2003	MARTIN INTL. DEAD - DELIST 19/07/2004
HERCULES PROPERTY DEAD - T/O BY 28134V	YOUNG & CO.BREW.NV.
WATERFALL HOLDINGS DEAD - DEAD 31/07/2000	WF ELECTRICAL DEAD - DEAD 24/11/2000
MSB INTERNATIONAL	SYLTONE DEAD - DELIST 02/02/2004
MAIDEN GROUP	HYDER CONSULTING
COUTTS HLDGS DEAD - DELIST 12/11/2004	WARD HOLDINGS DEAD - 15/09/2000
CAMAXYS GROUP SUSP - 28/06/2005	DEWHIRST GROUP DEAD - DEAD 03/12/2001
THOMAS POTTS DEAD - DEAD 14/04/2003	FII GROUP SUSP - 29/09/2003
LUMINAR	FIRST TECHNOLOGY
EPIC GROUP	DENSITRON TECHNOLOGIES
MULBERRY GROUP	NWIDE.ACCID.REPR.SVS. DEAD - 09/08/2002
PRISM RAIL DEAD - 23/10/2000	COUNTRYSIDE PROPS. DEAD - DELIST 14/03/2005
CARISBROOKE SHIP. DEAD - TAKEOVER	UA GROUP DEAD - DELIST 28/02/2005

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EUROPEAN TELECOM DEAD - DEAD 28/10/2002	BEAUFORD
PPL THERAPEUTICS DEAD - DELIST 30/07/2004	VITEC GROUP
THORN DEAD - DEAD 10/11/1998	CORDIANT COMMS.GP. DEAD - DEAD 16/07/2003
CITY TECHNOLOGY DEAD - DELIST.04/05/2000	SILENTNIGHT HDG. DEAD - DELIST 03/11/2003
THEO FENNELL	HIGHBURY HOUSE COMMS.
PROTAGONA DEAD - 11/12/2002	BRIT.DATA MAN. DEAD - T/O 905728
INDE.ENERGY HDG. DEAD - 25/07/2001	MIRROR GP. DEAD - DEAD 22/11/1999
FIBERNET GROUP	SCOT.& SOUTHERN ENERGY
ADL	SCOTTISH POWER
PACE MICRO TECHNOLOGY	CLAREMONT GARM. DEAD - DEAD 16/12/1998
JARVIS HOTELS DEAD - DELIST 09/02/2004	ADAM & HARVEY GP. DEAD - DEAD 18/07/2002
SINCLAIR MONTROSE HEALTHCARE DEAD 07/09/1999	SAVE GROUP DEAD - DEAD 26/11/2001
STAFFWARE DEAD - DELIST 06/07/2004	BURN STEW.DISTS. DEAD - 31/01/2003
SOLID STATE SUPPLIES	HOMESERVE
VOCALIS GROUP DEAD - DELIST 09/05/2005	FORTH PORTS
WHITTARD OF CHELSEA	INDUSTRIAL CNTL.SVS. DEAD - 14/09/2000
CIRQUAL DEAD - DEAD 07/01/2000	BROCKHN.HDG. DEAD - 23/01/2002
7 GROUP DEAD - DELIST 10/05/2004	BROCKHN.HDG.NV.'A' DEAD - 23/01/2002
BELHAVEN GROUP	PELICAN GROUP DEAD - T/O 900271
GAMINGKING	EAST MIDLANDS ELTY. DEAD - T/O CASH
HAT PIN	LONDON ELTY. DEAD - T/O 902306
PLASMON	MIDLANDS ELTY. DEAD - TAKEOVER
ALLIED CARPETS DEAD - DEAD 01/12/1999	NORTHERN ELEC. DEAD - T/O CASH
UNO DEAD - 09/02/2001	SOUTHERN ELEC. DEAD - CANCEL.30/12/1998
DA GROUP	YORKSHIRE ELTY. DEAD - T/O CASH
WATERMARK GROUP	ALLIANCE UNICHEM
ATKINS(W.S)	LE RICHE GROUP DEAD - DEAD 16/09/2002
XAVIER COMPUTER GP. DEAD - DEAD 26/04/1999	VP
HIT ENTERTAINMENT DEAD - 25/05/2005	MORE GROUP DEAD - T/O BY 510096
SOMERFIELD	ANN STREET GP. DEAD - DEAD 16/09/2002
DAIRY CREST	MALLET
AFA SYSTEMS DEAD - T/O BY 926005	DANKA BUSINESS SYSTEMS
BARBICAN HEALTHCARE DEAD - DEAD 18/03/1999	BANKS (SIDNEY C) DEAD - DEAD 10/02/2000
GALL THOMSON ENV. DEAD - DEAD 22/12/1999	ST.IVES
DENTMASTER HOLDINGS DEAD - DEAD 16.06.99	BLACK ARROW GROUP
ASTON VILLA	CRESTACARE DEAD - DEAD 28/09/1999
CONCURRENT TECHNOLOGIES	ENSOR HOLDINGS
IMPERIAL TOBACCO GP.	HEAVITREE 'A' L/V
SOPHEON	FLEXTech DEAD - DELIST.23/05/2000
DELTRON ELECTRONICS	MERRYDOWN DEAD - 04/05/2005
ORIENTAL RESTAURANT DEAD - DEAD 24/01/2001	TRAVIS PERKINS
WEEKS GROUP DEAD - DELIST 04/07/2003	SURREY GROUP DEAD - DEAD 01/12/1999
AEA TECHNOLOGY	SALVESEN(CHRIS.)
SHALIBANE DEAD - DEAD 01/10/2001	UTILITY CABLE DEAD - DEAD 23/09/1999
ULTRA ELECTRONICS HDG.	OXFORD INSTRUMENTS
PNC TELECOM	CLARKSON
EURASIA MINING	EXEL DEAD - DEAD 14/06/2000
THISTLE HOTELS DEAD - 17/07/2003	ULTRASIS
LAVENDON GROUP	KINGFISHER
AIRTECH DEAD - DEAD 05/07/1999	TAYLOR & FRANCIS DEAD - 10/05/2004
MEARS GROUP	RAMCO ENERGY
FITNESS FIRST DEAD - 09/07/2003	FIRST LEISURE DEAD - DEAD 31/01/2000
VICTORY	GUITON GROUP DEAD - 24/12/2003
JOHN DAVID GROUP	HOW GROUP DEAD - DEAD 28/08/1998

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LOFTUS ROAD DEAD - DEAD 02/04/2001	REUTERS GROUP
JARDINERIE INTERIORS DEAD - DEAD 14/01/2000	BNB RESOURCES
MONDAS	ETAM DEAD - DEAD 07/04/1998
GULLANE ENTM. DEAD - DEAD 30/09/2002	GOWRINGS DEAD - DELIST 23/03/2005
BRANDS HATCH LEISURE DEAD - DEAD 11/02/2000	JLI GROUP DEAD - DEAD 07/04/1998
BEAUFORT INTERNATIONAL	LOPEX DEAD - DEAD 22/11/1999
MAJESTIC WINE	RYLAND GP. DEAD - DEAD 30/09/2003
DRUID DEAD - DEAD 15/05/2000	UMECO
LIMELIGHT DEAD - DEAD 27/10/2000	ROLLS-ROYCE GROUP
PROVEND GROUP DEAD - DEAD 14/04/1999	TIBBETT &.BRITTEN DEAD - DELIST 29/09/2004
ADVANCED POWER COMPNS.	PORVAIR
GB RAILWAYS GP. DEAD - DELIST 22/09/2003	PRESTWICK HDG. DEAD - DEAD 07/09/1999
ACCESS PLUS DEAD - DELIST 01/12/2003	SUTTON HARBOUR HDG.
FUTURE INTEG.TELEPHONY DEAD - DELIST 29/02/02	PLANIT HOLDINGS
CHARTERHOUSE COMMS.	CARE FIRST GROUP DEAD - DEAD 05/03/1998
RECYCLING SERVICES GP. DEAD - DEAD 31/03/2000	TGI DEAD - 19/02/2002
DAWN TIL DUSK HDG. DEAD - DEAD 13/12/1999	TITON HOLDINGS
AVEVA GROUP	GARDINER GROUP DEAD - DEAD
PARKWOOD HOLDINGS	PALMARIS CAPITAL
YEOMAN GP. DEAD - DELIST 28/06/2004	NAVAN MINING DEAD - DEAD 31/07/2003
KIER GROUP	AUKETT GROUP
LINDEN DEAD - DEAD 04/12/2000	PSION
CROWN LEISURE DEAD - DEAD 29/07/1999	MTL INSTRUMENTS GP.
HIGHAMS SYSTEMS SVS.GP.	TOTAL SYSTEMS
ON-LINE	COUTTS CNSL.GP. DEAD - T/O BY CASH
NETCALL	VT GROUP
FOUNTAINS	HOLDERS TECHNOLOGY
WEST BROMWICH ALBION DEAD - DELIST 11/01/2005	MORRIS ASHBY DEAD - T/O CASH
JOHN LEWIS OF HUNGERFORD	DUD.JENKINS GP. DEAD - DEAD 04/05/1999
IMS GROUP DEAD - DEAD 10/10/2002	DAGENHAM MOTORS DEAD - DEAD 27/05/1999
CENTRICA	CLINTON CARDS
KEYSTONE SLTN.GP. DEAD - 17/06/2002	QA
PSD GROUP	JOHNSTON PRESS
BIRMINGHAM CITY	EYECARE PRDS. DEAD - T/O BY CASH
NORD ANGLIA EDUCATION	ROSKEL DEAD - T/O 946054
CENES PHARMACEUTICALS	SERCO GROUP
AORTECH INTERNATIONAL	THORNTONS
HOWLE HOLDINGS	SHANI GROUP DEAD - DEAD 29/08/2000
PETARDS GROUP SUSP - 04/07/2005	PAGE(MICHAEL)GP. DEAD - T/O CASH
TRANSACSYS DEAD - 02/09/2002	SANDERSON GROUP DEAD - DEAD 13/04/2000
CAMBRIDGE MINERAL RES.	WATERMAN GROUP
DOBBIES GARDEN CENTRES	PROWTING DEAD - DEAD 15/07/2002
LONDON BRIDGE SOFTWARE DEAD - 28/06/2004	ASW HOLDINGS DEAD - DEAD 03/04/2003
DIAGONAL DEAD - DELIST 27/09/2004	ANGLESEY MINING
TOTAL OFFICE GROUP DEAD - DEAD 22/11/1999	SOUTHNEWS DEAD - DEAD 26/01/2001
WORLD TELECOM DEAD - DEAD 06/03/2000	SCOTT PICKFORD
KBC ADVANCED TECHS.	ACAL
HEAL'S DEAD - DELIST 29/10/2001	APPLEBY WWARD.GP. DEAD - DELIST 01/09/1997
CAMBRIDGE ANTIBODY TECH.	TAMS (JOHN) GP. DEAD - DEAD 01/12/2000
DONATANTONIO DEAD - DELIST 11/02/2004	EUROCOPY DEAD - DELIST 31/08/2004
WHITEHEAD MANN GP.	CITY OF LONDON GROUP
LEICESTER CITY DEAD - 25/11/2002	ORBIS
NEWCASTLE UNITED	SEVERFIELD-ROWEN
HARVEY NASH GROUP	COLEFAX GROUP

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UNITED OVERSEAS GROUP DEAD - DEAD 28/09/2001	LINCAT GROUP
NMT GROUP	BUCKNALL GROUP DEAD - DEAD 19/11/1998
EQUATOR GROUP	TLS DEAD - DEAD T/O CASH
SAMEDAYBOOKS.CO.UK	WORLD TRADE SYSTEMS
COMINO GROUP	DANA PETROLEUM
SALEHURST DEAD - DEAD 26/08/1999	FAUPEL
C & W COMMS. DEAD - DEAD 12/05/2000	SIG
DRAGONS HEALTH CLUBS DEAD - DEAD 08/03/2001	BOXMORE INTL. DEAD - DEAD 17/04/2000
LONGBRIDGE INTERNATIONALSUSP - 21/06/2005	MANCHESTER UNITED DEAD - DELIST 22/06/2005
IS SOLUTIONS	EDINBURGH OIL & GAS DEAD - DELIST 05/07/2005
COMPUTERLAND UK	BELGRAVIUM TECH.
ARAM RESOURCES DEAD - 09/01/2001	GREGGS
CODASCISYS	SCOTIA HOLDINGS DEAD - DEAD 30/11/2001
LATCHWAYS	VODAFONE GROUP
XAAR	RIVA GROUP DEAD - DEAD 03/12/1999
ULTRAFRAME	SWP GROUP
PROVALIS	JEYES DEAD - DEAD 11/09/1998
SAATCHI & SAATCHI DEAD - 08/09/2000	CHIEFTAIN GROUP
INTELLIPLUS GROUP DEAD - DELIST 22/10/2003	PORTMEIRION GROUP
HOLMES PLACE DEAD - DEAD 07/08/2003	EW FACT DEAD - T/O BY 888438
WORKPLACE TECHNOLOGIES DEAD - DEAD 26/10/1999	AMSTRAD
NEWMARK SECURITY	SPECTRIS
EAGLES PLC DEAD - DEAD 18/11/1999	DAWSON DEAD - DEAD 11/10/2000
SOCO INTERNATIONAL	DART GROUP
TOPPS TILES	BOSTROM DEAD - DEAD 07/12/2000
GALLAHER GROUP	APOLLO METALS DEAD - TAKEOVER
ROYALBLUE	BARCOM
SBS GROUP	COMPASS GROUP DEAD - DEAD 27/07/2000
SGB GROUP DEAD - DEAD 20/07/2000	CASSIDY BROTHERS
POWDERJECT PHARMS. DEAD - DEAD 05/08/2003	TIE RACK DEAD - DEAD 12/07/1999
HIGHLAND TIMBER	WARNER HOWARD DEAD - DEAD 953510
PORTRAIT SOFTWARE	PROTEAN DEAD - DEAD 10/02/1998
PO NA NA GROUP DEAD - DELIST 30/10/2003	BRITANNIA GROUP DEAD - 14/06/2000
GRIFFIN MINING	HARTSTONE GROUP DEAD - DELIST 19/07/2004
WARNER CHILCOTT DEAD - DELIST 06/01/2005	MEDEVA DEAD - DEAD 26/01/2000
BAKERY SERVICES	PARITY GROUP
DELCAM	SHELTON (MARTIN) SUSP - 25/05/2005
CAMMELL LAIRD HOLDINGS DEAD - DEAD 30/11/2001	BAA
NORTHERN RECRUITMENT	KLEENEZE
MINORPLANET SYSTEMS	HOGG ROBINSON DEAD - 11/09/2000
MAELOR	COOK (DC) HDG. DEAD - DEAD 20/07/2001
CRC GROUP	GREENWAY HDG. DEAD - DEAD 16/06/2000
METROLINE DEAD - 23/05/2000	GALLEON HOLDINGS
TED BAKER	GIBBS MEW DEAD - T/O BY 137668
BHP BILLITON	LYNX GP. DEAD - 05/03/2002
KINGFISHER LEISURE DEAD - 07/09/2001	RPS GROUP
FAIRPLACE CONSULTING	ADSCENE GROUP DEAD - DEAD 13/10/1999
FAIRFIELD ENTERPRISES DEAD - DEAD 27/07/2000	JOHN LUSTY GP. DEAD - DEAD 03/04/2003
STERLING ENERGY	HADLEIGH DEAD - DEAD 10/02/2000
LANDROUND	SEACON HOLDINGS DEAD - DEAD 01/10/2001
LASER SCAN HDG. DEAD - DEAD 20/06/2000	DOLPHIN PACK. DEAD - 26/09/2000
DE VERE GROUP	ALBA

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GREENE KING	WSP GROUP
MANSFIELD BREW. DEAD - DEAD 29/02/2000	SHERIFF HDG. DEAD - T/O BY 906045
MARSTON THOMPSON DEAD - T/O BY 900274	BANNER HOMES GP. DEAD - DEAD 18/03/1999
SCOTTISH & NEWCASTLE	ISA INTL. DEAD - DEAD 18/07/2002
WHITBREAD	AIRSPRUNG FURNITURE GP.
WHITBREAD 'B'	JACKSON GROUP DEAD - T/O BY 911223
WOLV.& DUDLEY	POLYHEDRON HOLDINGS DEAD - DEAD 19/11/1998
MATTHEW CLARK DEAD - T/O BY CASH	BROOKS SERVICE DEAD - DEAD 16/02/2001
HIGHLAND DISTILLERS DEAD - DEAD 26/01/2000	FILOFAX GROUP DEAD - T/OVER
GLENMORANGIE 'A' DEAD - DELIST 01/02/2005	EPWIN GROUP DEAD - DEAD 11/02/2000
GLENMORANGIE 'B' DEAD - DELIST 01/02/2005	BELLWINCH DEAD - T/O BY 882977
CADBURY SCHWEPPE	PGI GROUP
BBA GROUP	CALDERBURN DEAD - T/O BY CASH
CAPE	DOEFLEX DEAD - DELISTED
IBSTOCK DEAD - TAKEOVER	SELECT APPT.HDG. DEAD - DEAD 21/12/1999
REDLAND DEAD - 13/02/1998	BLP GROUP DEAD - 08/02/2001
BLUE CIRCLE INDS. DEAD - DEAD 12/07/2001	CROWN EYEGLASS DEAD - DEAD 11/08/2000
RMC GROUP DEAD - DELIST 01/03/2005	DELPHI GP. DEAD - DEAD 20/05/1999
RUGBY GROUP DEAD - DEAD 21/03/2000	BWI DEAD - DEAD 02/08/1999
BRYANT GROUP DEAD - DEAD 23/04/2001	HR OWEN
COSTAIN GROUP	RONSON DEAD - DEAD 15/07/2003
GLEESON (MJ) GROUP	TOMORROWS LEIS. DEAD - T/O 903015
INTL.PUBLIC RELATIONS DEAD - EXCH.INTO U:IPG	POOLE INVESTMENTS
MCALPINE(ALFRED)	TRY GROUP DEAD - DEAD 30/10/2000
MOWLEM	CAPITA GROUP
TAYLOR WOODROW	SERVOMEX DEAD - DEAD 25/08/1999
INTERSERVE	MID KENT HDG. DEAD - 03/07/2001
WIMPEY (GEORGE)	INNOVATA
WICKES DEAD - DEAD 21/12/2000	VTR
BPB	NESTOR HEALTHCARE
HEPWORTH DEAD - DEAD 02/04/2001	SPEEDY HIRE
MARLEY DEAD - T/O BY CASH	TREATT
CAKEBREAD,RBY.A DEAD - DEAD 02/12/1999	TRACE GROUP
BREEDON DEAD - DEAD 12/07/2000	WENSUM COMPANY
BRIT.DREDGING DEAD - DEAD 24/08/1998	VDC DEAD - T/O BY 777559
ENG.CHINA CLAYS DEAD - DEAD 17/06/1999	TORDAY & CARLISLE
MORGAN CRUCIBLE	PENTLAND GROUP DEAD - DEAD 15/11/1999
COOKSON GROUP	FRENCH CONNECTN.GROUP
MANDERS DEAD - TO/CASH 09/03/1998	BERKELEY GP.HDG.UNITS
BOC GROUP	TINSLEY (ELIZA)
HICKSON INTL. DEAD - DEAD 11/10/2000	ENTERPRISE OIL DEAD - DEAD 25/06/2002
IMPERIAL CHM.INDS.	CANTERBURY FOODS GROUP
LAPORTE DEAD - DEAD 10/04/2001	PEGASUS DEAD - DEAD 12/04/2000
YORKS.GROUP DEAD - DELIST 08/10/2004	STAT-PLUS GROUP DEAD - DEAD 18/01/2001
BTR DEAD - DEAD 04/02/1999	BODY SHIP INTL.
CRODA INTERNATIONAL	HAVELOCK EUROPA
GLAXOSMITHKLINE	FASTRACK GROUP DEAD - DEAD 09/08/2001
LONDON INTL.GP. DEAD - T/O BY 914579	CANNONS GROUP DEAD - 07/08/2001
RECKITT BENCKISER	GLOBAL NATURAL ENERGY
SMITH & NEPHEW	TDS CIRCUITS DEAD - DEAD 30/11/1998
SPIRENT	LUMINATION DEAD - 11/09/2000
BALFOUR BEATTY	NORBAIN DEAD - DEAD 15/11/1999
MARCONI DEAD - EXCH SEE 26958F	CML MICROSYSTEMS
ELEKTRON	TAY HOMES DEAD - 22/02/2002

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BULGIN 'A' DEAD - DEAD 07/04/2000	VISLINK
CANNING (W) DEAD - DEAD 17/02/1999	BASE GROUP
ELECO	RCO HOLDINGS DEAD - 08/09/2000
SMITHKLINE BHM. DEAD - DEAD 27/12/2000	ROLFE & NOLAN DEAD - DEAD 03/04/2003
VOLEX GROUP	BLUEBIRD TOYS DEAD - DEAD 11/09/1998
ATLANTIC CASPIAN RES. DEAD - DEAD 12/05/2003	SINCLAIR WM.HLDG
ASTEC (BSR) DEAD - DEAD 11/02/1999	ANGLO PACIFIC GROUP
BABCOCK INTL.	SCOTTISH RADIO HOLDINGS
RACAL ELECTRONIC DEAD - DEAD 27/07/2000	PACIFIC MEDIA
MOLINS	COMMUNITY HOSPITALS DEAD - DEAD 17/07/2001
EMI GROUP	ULTIMA NETWORKS
PERKINS FOODS DEAD - DEAD 26/03/2001	GCAP MEDIA
BORTHWICKS DEAD - T/O BY 923330	M P EVANS GROUP
NEWMARKET INVESTMENTS	HILLSDOWN HDG. DEAD - DEAD
SPG MEDIA GROUP	TINSLEY ROBOR DEAD - DEAD 27/10/1998
MISSION TESTING DEAD - DEAD 22/10/2002	VIRTUAL INTERNET DEAD - DELIST 27/03/2002
HEALTH CLINIC (THE) DEAD - DEAD 26/03/2003	GENT (SR)
DELANEY GROUP DEAD - DEAD 27/04/1998	WILLISHAM GROUP DEAD - DEAD 30/05/2002

References

Accounting Standards Board (1991A). Statement of Principles, Chapter 1 and 2. London.

Accounting Standards Board (1996). Financial Reporting Standard (FRS) No.1, Cash Flow Statements. London.

Ali, A. (1994). "The Incremental Information Content of Earnings, Working Capital from Operations, and Cash Flows." Journal of Accounting Research. 32(1): Spring PP. 61: 74.

Ali, A. and P. F. Pope (1994). "The Incremental Information Content of Earnings, Funds Flow and Cash Flow: The U.K. Evidence." Working Paper Version, The Management School, Lancaster University. PP. 1: 32.

Ali, A. and P. F. Pope (1995). "The Incremental Information Content of Earnings, Funds Flow and Cash Flow: The UK Evidence." Journal of Business Finance & Accounting. 22(1): January PP. 19: 34.

Ali, A. and P. Zarowin (1992 A). "The Role of Earnings Levels in Annual Earnings>Returns Studies." Journal of Accounting Research. 30(2): Autumn PP. 286: 296.

Ali, A. and P. Zarowin (1992 B). "Permanent versus Transitory Components of Annual Earnings and Estimation Error in Earnings Response Coefficients." Journal of Accounting and Economics. 15(2-3): June/September PP. 249: 264.

Altman, E. I. (1968). "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy." The Journal of Finance. 23(4): September PP. 589: 609.

American Institute of Certified Public Accountants (AICPA) (1961). Accounting Research Study No. 2, Cash Flow Analysis and the Funds Statement. New York: AICPA.

Arellano, M. (2003). Panel Data Econometrics: Advanced Texts in Econometrics. New York, Oxford University Press.

Arnold, A. J., C. D. B. Clubb, et al. (1991). "The Relationship between Earnings, Funds Flows and Cash Flows: Evidence for the UK." Accounting and Business Research. 21(85): Spring PP. 13: 19.

Ashton, R. (1976). "Cash Flow Accounting: A Review and Critique." Journal of Business Finance & Accounting. 3(4): Winter PP. 63: 81.

Aziz, A., D. C. Emanuel, et al. (1988). "Bankruptcy Prediction - An Investigation of Cash Flow Based Models." Journal of Management Studies. 25(5): September PP. 419: 437.

Aziz, A. and G. H. Lawson (1989). "Cash Flow Reporting and Financial Distress Models: Testing of Hypotheses." Financial Management. 18(1): Spring PP. 55: 63.

Bahnson, P. R., P. B. W. Miller, et al. (1996). "Nonarticulation in Cash Flow Statements and Implications for Education, Research and Practice." Accounting Horizons. 10(4): December PP. 1: 15.

Ball, R. and P. Brown (1968). "An Empirical Evaluation of Accounting Income Numbers." Journal of Accounting Research. 6(2): Autumn PP. 159: 178.

Ball, R. and S. P. Kothari (1991). "Security Returns Around Earnings Announcements." The Accounting Review. 66(4): October PP. 718: 738.

Ball, R. and R. Watts (1972). "Some Time Series Properties of Accounting Income." Journal of Finance. 27(3): June PP. 663: 681.

Barrak, M. B. (1995). An Empirical Investigation of the Information Content of Cash Flow and Cash Flow Per Share, PhD Thesis, University of Glasgow.

Barth, M. E., D. P. Cram, et al. (2001). "Accruals and the Prediction of Future Cash Flows." The Accounting Review. 76(1): January PP. 27: 58.

Bartov, E., S. R. Goldberg, et al. (2001). "The Valuation-Relevance of Earnings and Cash Flows: an International Perspective." Journal of International Financial Management and Accounting. 12(2): Summer PP. 103: 132.

Beaver, W., R. Lambert, et al. (1980). "The Information Content of Security Prices." Journal of Accounting and Economics. 2(1): March PP. 3: 28.

Beaver, W. H. (1966). "Financial Ratios as Predictors of Failure." Journal of Accounting Research. 4(3): Supplement PP. 71: 111.

Beaver, W. H. (1968). "The Information Content of Annual Earnings Announcements." Journal of Accounting Research. 6(Supplement): PP. 67: 92.

Beaver, W. H. and R. E. Dukes (1972). "Interperiod Tax Allocation, Earnings Expectations, and the Behavior of Security Prices." The Accounting Review. 47(2): April PP. 320: 332.

Beaver, W. H., P. A. Griffin, et al. (1982). "The Incremental Information Content of Replacement Cost Earnings." Journal of Accounting and Economics. 4(1): July PP. 15: 39.

Beaver, W. H., R. A. Lambert, et al. (1987). "The Information Content Of Security Prices: A Second Look." Journal of Accounting and Economics. 9(2): July PP. 139: 157.

Belkaoui, A. (1983). "Accrual Accounting and Cash Accounting: Relative Merits of Derived Accounting Indicator Numbers." Journal of Business Finance & Accounting. 10(2): Summer PP. 299: 312.

Belkaoui, A. R. (2004). Accounting Theory. 5th ed. United Kingdom, Thomson.

Bernard, V. L. (1987). "Cross-Sectional Dependence and Problems in Inference in Market-Based Accounting Research." Journal of Accounting Research. 25(1): Spring PP. 1: 48.

Bernard, V. L. and T. L. Stober (1989). "The Nature and Amount of Information in Cash Flows and Accruals." The Accounting Review. 64(4): October PP. 624: 652.

Biddle, G. C., R. M. Bowen, et al. (1997). "Does EVA Beat Earnings? Evidence on Associations with Stock Returns and Firm Values." Journal of Accounting and Economics. 24(3): December PP. 301: 336.

Biddle, G. C. and G. S. Seow (1993). "Relative Versus Incremental Information Content and Cross-Industry Evidence for Net Income." Working Paper, University of Washington.

Biddle, G. C., G. S. Seow, et al. (1994). "Relative Versus Incremental Information Content." Working Paper Version 1.1, University of Washington.: September PP. 1: 28.

Biddle, G. C., G. S. Seow, et al. (1995). "Relative Versus Incremental Information Content." Contemporary Accounting Research. 12(1-1): Summer PP. 1: 23.

Blake, J. (1997). Accounting Standards. 6th ed. London, Pitman Publishing.

Board, J. L. G. and J. F. S. Day (1989). "The Information Content of Cash Flow Figures." Accounting and Business Research. 20(77): Winter PP. 3: 11.

Board, J. L. G., J. F. S. Day, et al. (1989). "The Information Content of Unexpected Accounting Income, Funds Flow and Cash Flow." Institute of Chartered Accountants in England and Wales. PP. 1: 16.

Bowen, R. M., D. Burgstahler, et al. (1986). "Evidence on the Relationships Between Earnings and Various Measures of Cash Flow." The Accounting Review. 61(4): October PP. 713: 725.

Bowen, R. M., D. Burgstahler, et al. (1987). "The Incremental Information Content of Accrual Versus Cash Flows." The Accounting Review. 62(4): October PP. 723: 747.

- Brown, L. D., R. L. Hagerman, et al. (1987). "An Evaluation Of Alternative Proxies For The Market's Assessment Of Unexpected Earnings." Journal of Accounting and Economics. 9(2): July PP. 159: 193.
- Brown, P. (1994). Capital Markets-Based Research in Accounting: an Introduction. 1st ed. Australia, Coopers & Lybrand.
- Brown, S. J. and J. B. Warner (1980). "Measuring Security Price Performance." Journal of Financial Economics. 8(3): September PP. 205: 258.
- Carslaw, C. A. and J. R. Mills (1991). "Developing Ratios for Effective Cash Flow Statement Analysis." Journal of Accountancy. 172(5): November PP. 63: 70.
- Casey, C. and N. Bartczak (1985). "Using Operating Cash Flow Data to Predict Financial Distress: Some Extensions." Journal of Accounting Research. 23(1): Spring PP. 384: 401.
- Casey, C. J. and N. J. Bartczak (1984). "Cash Flow-It's not the Bottom Line." Harvard Business Review. 62(4): July/August PP. 61: 66.
- Charitou, A. (1997). "The Role of Cash Flows and Accruals in Explaining Security Returns: Evidence for the UK." The European Accounting Review. 6(4): PP. 629: 652.
- Charitou, A. and C. Clubb (1999). "Earnings, Cash Flows and Security Returns Over Long Return Intervals: Analysis and UK Evidence." Journal of Business Finance & Accounting. 26(3 & 4): April/May PP. 283: 312.
- Charitou, A., C. Clubb, et al. (2001). "The Effect of Earnings Permanence, Growth and Firm Size on the Usefulness of Cash Flows and Earnings in Explaining Security Returns: Empirical Evidence for The UK." Journal of Business Finance & Accounting. 28(5 & 6): June/July PP. 563: 594.
- Charitou, A. G. and G. Venieris (1990). "The Need for Cash Flow Reporting: Greek Evidence." British Accounting Review. 22(2): June PP. 107:117.
- Cheng, C. S. A., C.-S. Liu, et al. (1996). "Earnings Permanence and the Incremental Information Content of Cash Flows from Operations." Journal of Accounting Research. 34(1): Spring PP. 173: 181.
- Cheng, C. S. A., C.-S. Liu, et al. (1997). "The Value-Relevance of SFAS No. 95 Cash Flows from Operations as Assessed by Security Market Effects." Accounting Horizons. 11(3): September PP. 1: 15.
- Cheng, C. S. A. and S. S. M. Yang (2003). "The Incremental Information Content of Earnings and Cash Flows from Operations Affected by Their Extremity." Journal of Business Finance & Accounting. 30(1 & 2): January/March PP. 73: 116.

Cho, J. Y. and K. Jung (1991). "Earnings Response Coefficients: A Synthesis of Theory and Empirical Evidence." Journal of Accounting Literature. 10: PP. 85: 116.

Christie, A. A. (1987). "On Cross-Sectional Analysis In Accounting Research." Journal of Accounting and Economics. 9(3): December PP. 231: 258.

Christie, A. A., M. D. Kenneley, et al. (1984). "Testing For Incremental Information Content in The Presence Of Collinearity." Journal of Accounting and Economics. 6(3): December PP. 205: 217.

Clubb, C. (2003). "Discussion of the Incremental Information Content of Earnings and Cash Flows from Operations Affected by Their Extremity." Journal of Business Finance & Accounting. 30(1 & 2): January/March PP. 117: 124.

Clubb, C. D. B. (1993). The Information Content of Accounting Earnings, Funds Flows and Cash Flows, PhD Thesis, University of London.

Clubb, C. D. B. (1995). "An Empirical Study of the Information Content of Accounting Earnings, Funds Flows and Cash Flows in the UK." Journal of Business Finance & Accounting. 22(1): January PP. 35: 52.

Collins, D. W. and S. P. Kothari (1989). "An Analysis of Intertemporal and Cross-Sectional Determinants of Earnings Response Coefficients." Journal of Accounting and Economics. 11(2-3): July PP. 143: 181.

Coughlan, J. W. (1964). "Funds and Income." NAA Bulletin. September PP. 23- 34.

Davidson, S., C. P. Stickney, et al. (1979). Financial Accounting: An Introduction to Concepts, Methods, and Uses. 2nd ed. Illinois, The Dryden Press.

Davies, M., R. Paterson, et al. (1999). UK GAAP: Generally Accepted Accounting Practice. 6th ed. Croydon, Butterworths.

Dechow, P. M. (1994). "Accounting Earnings and Cash Flows as Measures of Firm Performance: The Role of Accounting Accruals." Journal of Accounting and Economics. 18(1): July PP. 3: 42.

Dechow, P. M., S. P. Kothari, et al. (1998). "The Relation between Earnings and Cash Flows." Journal of Accounting and Economics. 25(2): May PP. 133: 168.

Donnelly, R. and M. Walker (1995). "Share Price Anticipation of Earnings and the Effect of Earnings Persistence and Firm Size." Journal of Business Finance & Accounting. 22(1): January PP. 5: 18.

Drtna, R. E. and J. A. Largay III (1985). " Pitfalls in Calculating Cash Flow from Operations." The Accounting Review. 60(2): April PP. 314: 326.

Dumontier, P. and B. Raffournier (2002). "Accounting and Capital Markets: a Survey of the European Evidence." The European Accounting Review. 11(1): May PP. 119: 151.

Easton, P. D. and T. S. Harris (1991). "Earnings as an Explanatory Variable for Returns." Journal of Accounting Research. 29(1): Spring PP. 19: 36.

Egginton, D. and B. O'Shea (1989). "Cash Flows or Funds Flows?" Accountancy. 104(1151): July P. 30.

Egginton, D. A. (1985). "Cash Flow, Profit and Performance Measures for External Reports: A Rejoinder." Accounting and Business Research. 15(58): Spring PP. 109: 112.

Emmanuel, C. B. (1988). "Cash Flow Reporting, Part 2: Importance of Cash Flow Data in Credit Analysis." The Journal of Commercial Bank Lending. June PP. 17: 28.

EViews 5 User's Guide (1994-2002). Quantitative Micro Software, LLC.

Fama, E. F. (1970). "Efficient Capital Markets: A Review of Theory and Empirical Work." The Journal of Finance. 25(2): May PP. 383: 417.

Fama, E. F. and J. D. Macbeth (1973). "Risk Return and Equilibrium: Empirical Tests." Journal of Political Economy. 71: May/June PP. 607: 636.

Fess, P. E. (1966). "The Working Capital Concept." The Accounting Review. 41(2): April PP. 266: 270.

Financial Accounting Standard Board (FASB) (1978). Statement of Financial Accounting Concepts (SFAC) No.1, Objectives of Financial Reporting by Business Enterprises. Stamford: Conn., November.

Financial Accounting Standard Board (FASB) (1980). Discussion Memorandum on Reporting Funds Flows, Liquidity, and Financial Flexibility. Stamford: Conn., December.

Financial Accounting Standard Board (FASB) (1984). Statement of Financial Accounting Concepts (SFAC) No.5, Recognition and Measurement in Financial Statement of Business Enterprises. Stamford: Conn., December.

Financial Accounting Standard Board (FASB) (1987). Statement of Financial Accounting Standards (SFAS) No. 95, Statement of Cash Flows. Stamford: Conn., November.

- Finger, C. A. (1994). "The Ability of Earnings to Predict Future Earnings and Cash Flow." Journal of Accounting Research. 32(2): Autumn PP. 210: 223.
- Foster, G. (1977). "Quarterly Accounting Data: Time-Series Properties and Predictive-Ability Results." The Accounting Review. 52(1): January PP. 1: 21.
- Freeman, R. N. and S. Y. Tse (1992). "A Nonlinear Model of Security Price Responses to Unexpected Earnings." Journal of Accounting Research. 30(2): Autumn PP. 185: 209.
- Garrod, N. and M. Hadi (1998). "Investor Response to Cash Flow Information." Journal of Business Finance & Accounting. 25(5 & 6): June/July PP. 613: 630.
- Gentry, J. A., P. Newbold, et al. (1985 A). "Classifying Bankrupt Firms with Funds Flow Components." Journal of Accounting Research. 23(1): Spring PP. 146: 160.
- Gentry, J. A., P. Newbold, et al. (1985 B). "Predicting Bankruptcy: If Cash Flow's Not the Bottom Line, What Is?" Financial Analysts Journal. 41(5): September/October PP. 47: 56.
- Gentry, J. A., P. Newbold, et al. (1987). "Funds Flow Components, Financial Ratios, and Bankruptcy." Journal of Business Finance & Accounting. 14(4): Winter PP. 595: 606.
- Giacomino, D. E. and D. E. Mielke (1993). "Cash Flows: Another Approach to Ratio Analysis." Journal of Accountancy. 175(3): March PP. 55: 58.
- Glautier, M. W. E. and B. Underdown (1997). Accounting Theory and Practice. 6th ed. London, Pitman Publishing.
- Golub, S. J. and H. D. Huffman (1984). "Cash Flow: Why It Should Be Stressed in Financial Reporting." Financial Executive.: February PP. 34: 40.
- Gombola, M. J., M. E. Haskins, et al. (1987). "Cash Flow in Bankruptcy Prediction." Financial Management. 16(4): Winter PP. 55: 65.
- Gombola, M. J. and J. E. Ketz (1983). "A Note on Cash Flow Classification Patterns of Financial Ratios." The Accounting Review. 58(1): January PP. 105: 114.
- Gore, R. and D. M. Stott (1998). "Toward a More Informative Measure of Operating Performance in The REIT Industry: Net Income Vs. Funds From Operations." Accounting Horizons. 12(4): December PP. 323: 339.

Green, J. P. (1999). "The Impact of the Quality of Earnings on the Valuation Relevance of Cash Flow Disclosures." British Accounting Review. 31(4): December PP. 387: 413.

Greene, W. H. (2003). Econometrics Analysis. 5th ed. New Jersey, Upper Saddle River.

Haw, I-M., D. Qi, et al. (2001). "The Nature of Information in Accruals and Cash Flows in an Emerging Capital Market: The Case of China." The International Journal of Accounting. 36(4): December PP. 391: 406.

Heath, L. C. (1978). "Let's Scrap The "Funds" Statement." The Journal of Accountancy. 146(4): October PP. 94: 103.

Heath, L. C. (1987). "Cash Flow Reporting: Bankers Need a Direct Approach." The Journal of Commercial Bank Lending. February PP. 50: 59.

Hussey, R. and D. Bence (1992). "Analysts and the Cash Flow Statement." Accountancy. 110(1189): September P.138.

Huyghebaert, N., A. Gaeremynck, et al. (2000). "New Firm Survival: The Effects of Start-up Characteristics." Journal of Business Finance & Accounting. 27(5 & 6): June/July PP. 627: 651.

Ijiri, Y. (1978). "Cash-Flow Accounting and Its Structure." Journal of Accounting Auditing & Finance. 1(4): Summer PP. 331: 348.

Ijiri, Y. (1980). "Recovery Rate and Cash Flow Accounting." Financial Executive. March PP. 54: 60.

International Accounting Standards Committee (2000). International Accounting Standards Explained. New York, John Wiley & Sons, Ltd.

Jennings, R. (1990). "A Note on Interpreting "Incremental Information Content"." The Accounting Review. 65(4): October PP. 925: 932.

Jones, S., C. A. Romano, et al. (1995). "An Evaluation of the Decision Usefulness of Cash Flow Statements by Australian Reporting Entities." Accounting and Business Research. 25(98): Spring PP. 115: 129.

Kennedy, P. (2003). A Guide to Econometrics. 5th ed. Cambridge, The MIT Press.

Ketz , J. E. and J. A. Largay III (1987). "Reporting Income and Cash Flows from Operations." Accounting Horizons. 1(2): June PP. 9: 17.

Kinnunen, J. and J. Niskanen (1993). "The Information Content of Cash Flows and the Random Walk: Evidence from the Helsinki Stock Exchange." Accounting and Business Research. 23(91): Summer PP. 263: 272.

Klammer, T. P. and S. A. Reed (1990). "Operating Cash Flow Formats: Does Format Influence Decisions?" Journal of Accounting and Public Policy. 9(3): Autumn PP. 217: 235.

Kothari, S. P. (2001). "Capital Markets Research in Accounting." Journal of Accounting and Economics. 31(1-3): September PP. 105: 231.

Kothari, S. P. and J. B. Warner (1997). "Measuring Long-Horizon Security Price Performance." Journal of Financial Economics. 43(3): March PP. 301: 339.

Kwok, H. (2002). "The Effect of Cash Flow Statement Format on Lenders' Decisions." The International Journal of Accounting. 37(3): PP. 347: 362.

Largay III, J. A. and C. P. Stickney (1980). "Cash Flows, Ratio Analysis and The W.T. Grant Company Bankruptcy." Financial Analysts Journal. 36(4): July/August PP. 51: 54.

Lawson, G. H. (1971). "Cash-Flow Accounting." The Accountant. October PP. 586: 589.

Lawson, G. H. (1973). "Some Arguments for Cash-Flow Accounting." Certified Accountant. April/May.

Lawson, G. H. (1985). "The Measurement of Corporate Performance on a Cash Flow Basis: A Reply to Mr. Egginton." Accounting and Business Research. 15(85): Spring PP. 99: 108.

Lee, T. (1984). Cash Flow Accounting. Berkshire, Van Nostrand Reinhold (UK) Co. Ltd.

Lee, T. (1992). "Making Cash flow Statements Useful." Accountancy. 109(1184): April P. 35.

Lee, T. A. (1972). "A Case for Cash Flow Reporting." Journal of Business Finance. 4(2): PP. 27: 36.

Lee, T. A. (1981). "Reporting Cash Flows and Net Realisable Values." Accounting and Business Research. 11(42): Spring PP. 163: 170.

Lev, B. and J. A. Ohlson (1982). "Market-Based Empirical Research in Accounting: A Review, Interpretation, and Extension." Journal of Accounting Research. 20(Supplement): PP. 249: 322.

Livnat, J. and P. Zarowin (1990). "The Incremental Information Content of Cash-Flow Components." Journal of Accounting and Economics. 13(1): May PP. 25: 46.

Lorek, K. S., T. F. Schaefer, et al. (1993). "Time-Series Properties and Predictive Ability of Funds Flow Variables." The Accounting Review. 68(1): January PP. 151: 163.

- Lorek, K. S. and G. L. Willinger (1996). "A Multivariate Time-Series Prediction Model For Cash-Flow Data." The Accounting Review, 71(1): January PP. 81: 101.
- Madani, H. H. (1995). An Empirical Examination of the Explanatory Power of Accrual Earnings Versus Cash Flows: UK Industrial Sector, PhD Thesis, Brunel University.
- Maddala, G. S. (2001). Introduction to Econometrics. 3rd ed. New York, John Wiley & Sons, Ltd.
- McGurr, P. T. and S. A. DeVaney (1998). "Predicting Business Failure of Retail Firms: An Analysis Using Mixed Industry Models." Journal of Business Research, 43(3): November PP. 169: 176.
- Mcleay, S., J. Kassab, et al. (1997). "The Incremental Information Content of Accruals: Evidence Based on the Exponential Smoothing of Levels and Trends in Pre-Tax Earnings, Funds Flow and Cash Flow." Journal of Business Finance & Accounting, 24(7& 8): September PP. 1147: 1167.
- Mielke, D. E. and D. E. Giacomino (1988). "Ratio Analysis Using the New Statement of Cash Flows." Corporate Accounting, 6(1): Winter PP.10: 16.
- Mills, J. R. and J. H. Yamamura (1998). "The Power of Cash Flow Ratios." Journal of Accountancy, 186(4): October PP. 53: 61.
- Monsen, N. (2001). "Cameral Accounting and Cash Flow Reporting: Some Implications for Use of the Direct or Indirect Method." The European Accounting Review, 10(4): PP. 705: 724.
- Neill, J. D., T. F. Schaefer, et al. (1991). "The Usefulness of Cash Flow Data: A Review and Synthesis." Journal of Accounting Literature, 10: PP. 117: 150.
- O'Hanlon, J., S. Poon, et al. (1992). "Market Recognition of Differences in Earnings Persistence: UK Evidence." Journal of Business Finance & Accounting 19(4): June PP: 625: 639.
- Ohlson, J. A. (1980). "Financial Ratios and the Probabilistic Prediction of Bankruptcy." Journal of Accounting Research, 18(1): Spring PP. 109: 131.
- Ohlson, J. A. and P. K. Shroff (1992). "Changes versus Levels in Earnings as Explanatory variables for Returns: Some Theoretical Considerations." Journal of Accounting Research, 30(2): Autumn PP. 210: 226.
- Ou, J. A. and S. H. Penman (1989). "Accounting Measurement, Price-Earnings Ratio, and the Information Content of Security Prices." Journal of Accounting Research, 27(Supplement): PP. 111: 144.

Patell, J. M. and R. S. Kaplan (1977). "The Information content of Cash Flows Data Relative to Annual Earnings: Preliminary Tests." Working Paper, Stanford University.

Pfeiffer, J. R. J. and P. T. Elgers (1999). "Controlling for Lagged Stock Price Responses in Pricing Regressions: An Application to the Pricing of Cash Flows and Accruals." Journal of Accounting Research. 37(1): Spring PP. 239: 247.

Pfeiffer, J. R. J., P. T. Elgers, et al. (1998). "Additional Evidence on the Incremental Information Content of Cash Flows and Accruals: The Impact of Errors in Measuring Market Expectations." The Accounting Review. 73(3): July PP. 373: 385.

Plenborg, T. (1998). "The Operating Cycle and the Information Content of Earnings and Cash Flow." Scandinavian Journal of Management. 14(3): March PP. 273: 287.

Rayburn, J. (1986). "The Association of Operating Cash Flow and Accruals with Security Returns." Journal of Accounting Research. 24(3): (Supplement) PP. 112: 133.

Schaefer, T. and M. Kennelley (1986). "Alternative Cash Flow Measures and Risk-Adjusted Returns." Journal of Accounting, Auditing & Finance. 1(4): Fall PP. 278: 287.

Schmidgall, R. S., A. N. Geller, et al. (1993). "Financial Analysis Using the Statement of Cash Flows." The Cornell H.R.A. Quarterly. February PP. 47: 53.

Scott, W. R. (2003). Financial Accounting Theory. 3rd ed. Toronto, Prentice Hall.

Shroff, P. K. (1998). "Properties of Accrual Income, Cash Flow and Security Return: An Interpretive Exercise." Issues in Accounting Education. 13(4): November PP. 1019: 1030.

Stickney, C. P., P. R. Brown, et al. (2004). Financial Reporting and Statement Analysis: A Strategic Perspective. 5th ed. United Kingdom, Thomson.

Strong, N. (1992). "Modelling Abnormal Returns: A Review Article." Journal of Business Finance & Accounting. 19(4): June PP. 533: 553.

Strong, N. (1993). "The Relation between Returns and Earnings: Evidence for the UK." Accounting and Business Research. 24(93): Winter PP. 69: 77.

Strong, N. and M. Walker (1993). "The Explanatory Power Of Earnings For Stock Returns." The Accounting Review. 68(2): April PP. 385: 399.

Thode, S. F., R. E. Drtina, et al. (1986). "Operating Cash Flows: A Growing Need for Separate Reporting." Journal of Accounting, Auditing & Finance. 1(1): Winter PP. 46: 57.

Vuong, Q. H. (1989). "Likelihood Ratio Tests for Model Selection and Non-nested Hypotheses." Econometrica. 57(2): March PP. 307: 333.

Walker, M. (1997). "Clean-Surplus Accounting Models and Market-based Accounting Research: A Review." Accounting and Business Research. 27(4): Autumn PP. 341: 355.

Ward, T. J. (1994). "An Empirical Study of the Incremental Predictive Ability of Beaver's Naive Operating Flow Measure Using Four-State Ordinal Models of Financial Distress." Journal of Business Finance & Accounting. 21(4): June PP. 547: 561.

Watts, R. L. and J. L. Zimmerman (1986). Positive Accounting Theory. New Jersey, Prentice-Hall.

White, G. I., A. C. Sondhi, et al. (2001). The Analysis and Use of Financial Statements. 3rd ed. New York, John Wiley & Sons, INC.

Wild, J. J., K. R. Subramanyam, et al. (2003). Financial Statement Analysis. 8th ed. New York, McGraw-Hill.

Wild, K. and C. Goodhead (1993). "Implementing FRS1." Accountancy. 112(1204): December PP. 87: 89.

Williams, P. A. (1995). "The Search for a Better Market Expectation Of Earnings Model." Journal of Accounting Literature. 14: PP. 140: 168.

Wilson, G. P. (1986). "The Relative Information Content of Accruals and Cash Flows: Combined Evidence at the Earnings Announcement and Annual Report Release Date." Journal of Accounting Research. 24(3): (Supplement) PP. 165: 200.

Wilson, G. P. (1987). "The Incremental Information Content of the Accrual and Funds Components of Earnings after Controlling for Earnings." The Accounting Review. 62(2): April PP. 293: 322.

Wooldridge, J. M. (2002). Econometric Analysis of Cross Section and Panel Data. London, The MIT Press.

Zeller, T. L. and B. B. Stanko (1994). "Operating Cash Flow Ratios Measure A Retail Firm's "Ability to Pay"." Journal of Applied Business Research. 10(4): Fall PP. 51: 59.

